CHAPTER 4

POINT AND NONPOINT SOURCE CHARACTERIZATION OF THE LOWER CLINCH RIVER WATERSHED

4.1. BACKGROUND. This chapter is organized by HUC-10 subwatershed, and the description of each subwatershed is divided into four parts:

i. General description of the subwatershed
ii. Description of point source contributions
ii.a. Description of facilities discharging to water bodies listed on the 2002 303(d) list
iii. Description of nonpoint source contributions

The Lower Clinch River Watershed (HUC 06010207) has been delineated into four HUC 10-digit subwatersheds.

Information for this chapter was obtained from databases maintained by the Division of Water Pollution Control or provided in the WCS (Watershed Characterization System) data set. The WCS used was version 2.0 (developed by Tetra Tech, Inc for EPA Region 4) released in 2003.

WCS integrates with ArcView® v3.x and Spatial Analyst® v1.1 to analyze user-delineated (sub)watersheds based on hydrologically connected water bodies. Reports are generated by integrating WCS with Microsoft® Word. Land Use/Land Cover information from 1992 MRLC (Multi-Resolution Land Cover) data are calculated based on the proportion of county-based land use/land cover in user-delineated (sub)watersheds. Nonpoint source data in WCS are based on agricultural census data collected 1992–1998; nonpoint source data were reviewed by Tennessee NRCS staff.

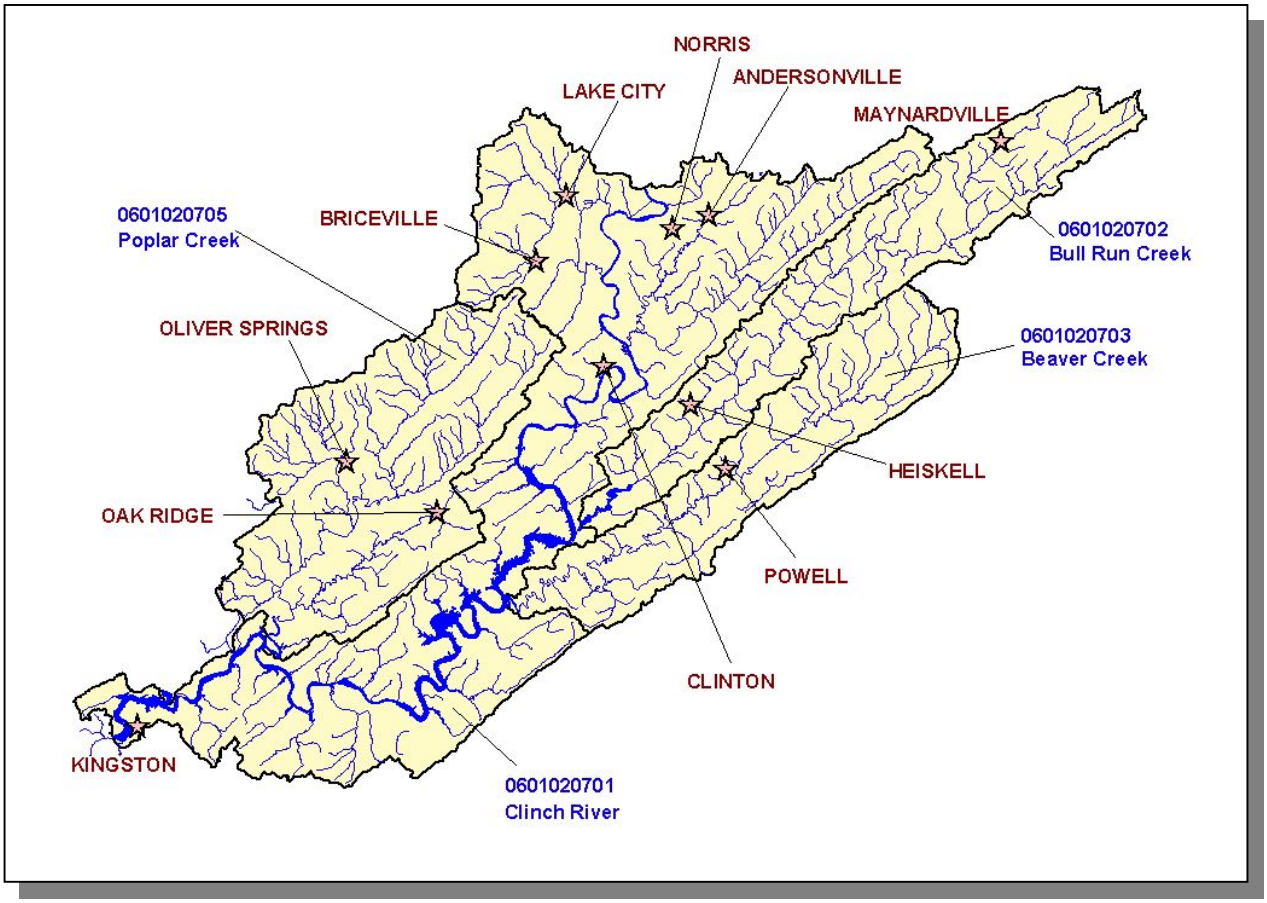

Figure 4-1. The Lower Clinch River Watershed is Composed of Four USGS-Delineated Subwatersheds (10-Digit Subwatersheds). *Locations of Andersonville, Clinton, Heiskell, Kingston, Lake City, Maynardville, Norris, Oak Ridge, Oliver Springs, and Powell are shown for reference.*

4.2. CHARACTERIZATION OF HUC-10 SUBWATERSHEDS. The Watershed Characterization System (WCS) software and data sets provided by EPA Region IV were used to characterize each subwatershed in the Lower Clinch River Watershed.

HUC-10	HUC-12
0601020701	060102070101 (Clinch River)
	060102070102 (Hinds Creek)
	060102070103 (Clinch River)
	060102070104 (Clinch River)
	060102070105 (Clinch River)
0601020702	060102070201 (Upper Bull Run Creek)
	060102070202 (Lower Bull Run Creek)
0601020703	060102070301 (Upper Beaver Creek)
	060102070302 (Lower Beaver Creek)
0601020705	060102070501 (Upper Poplar Creek)
	060102070502 (Lower Poplar Creek)
	060102070503 (East Fork Poplar Creek)

Table 4-1. HUC-12 Drainage Areas are Nested Within HUC-10 Drainages. *NRCS worked with USGS to delineate the HUC-10 and HUC-12 drainage boundaries.*

4.2.A. 0601020701 (Clinch River).

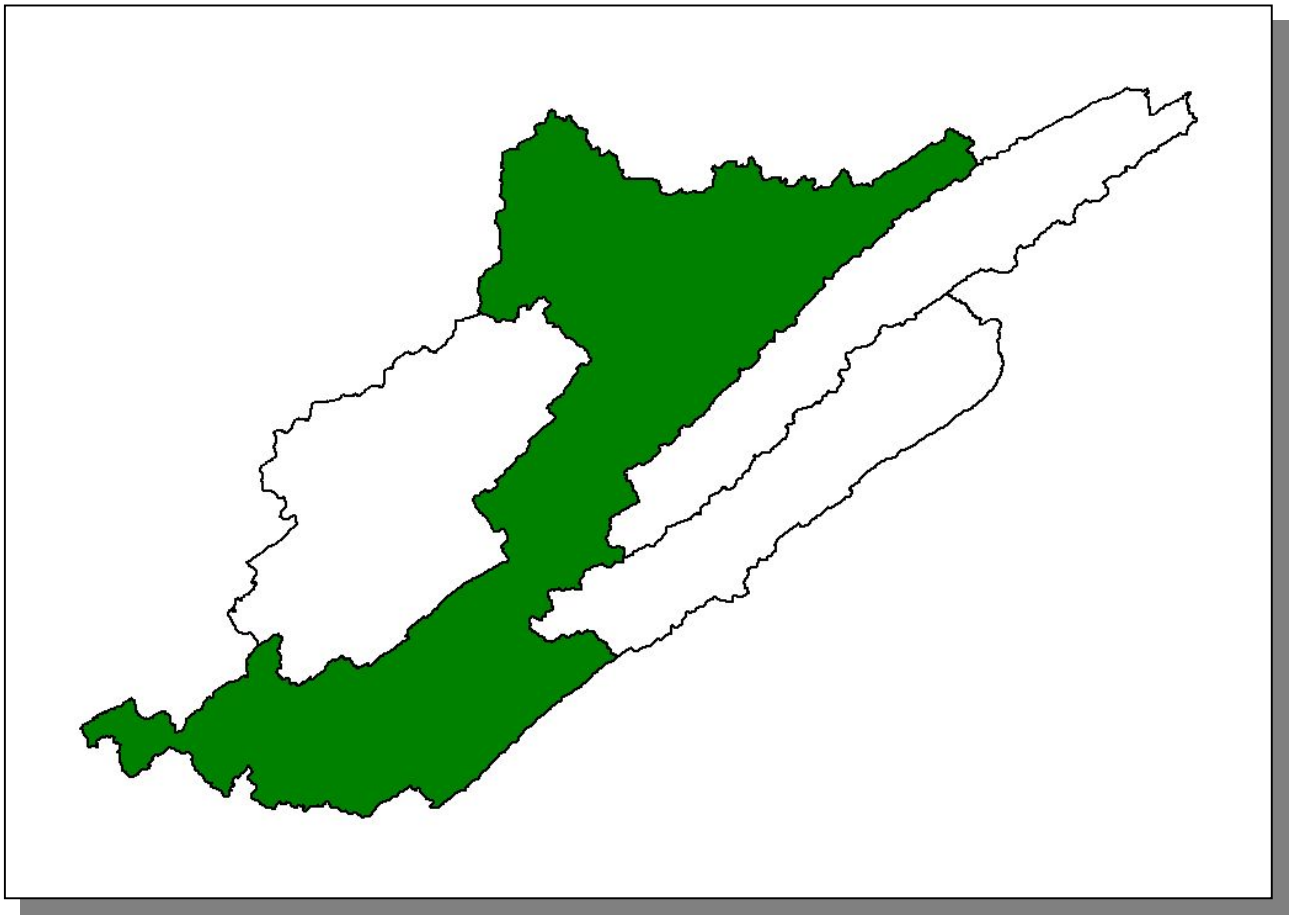

Figure 4-2. Location of Subwatershed 0601020701. *All Lower Clinch River HUC-10 subwatershed boundaries are shown for reference.*

4.2.A.i. General Description.

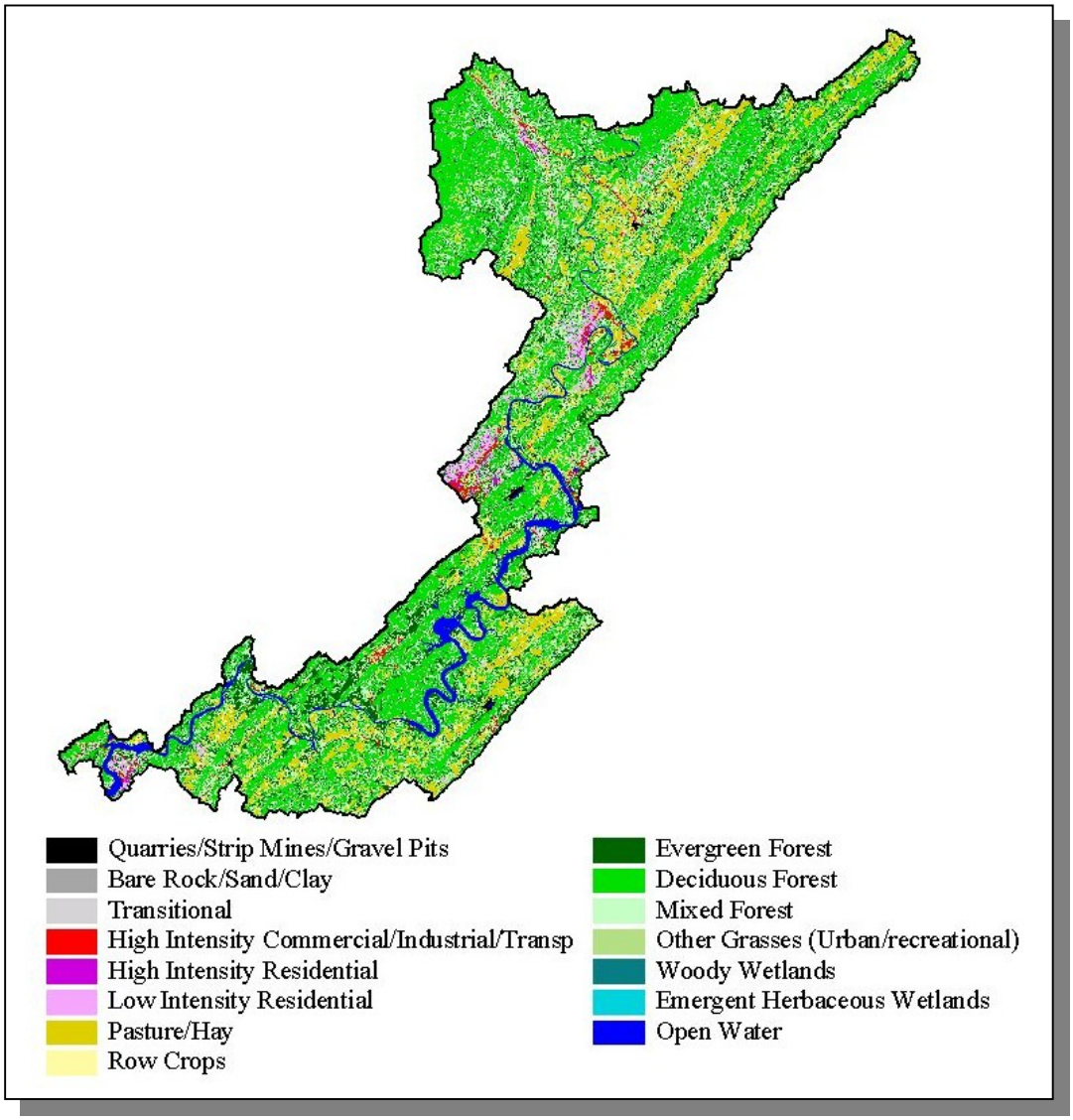

Figure 4-3. Illustration of Land Use Distribution in Subwatershed 0601020701.

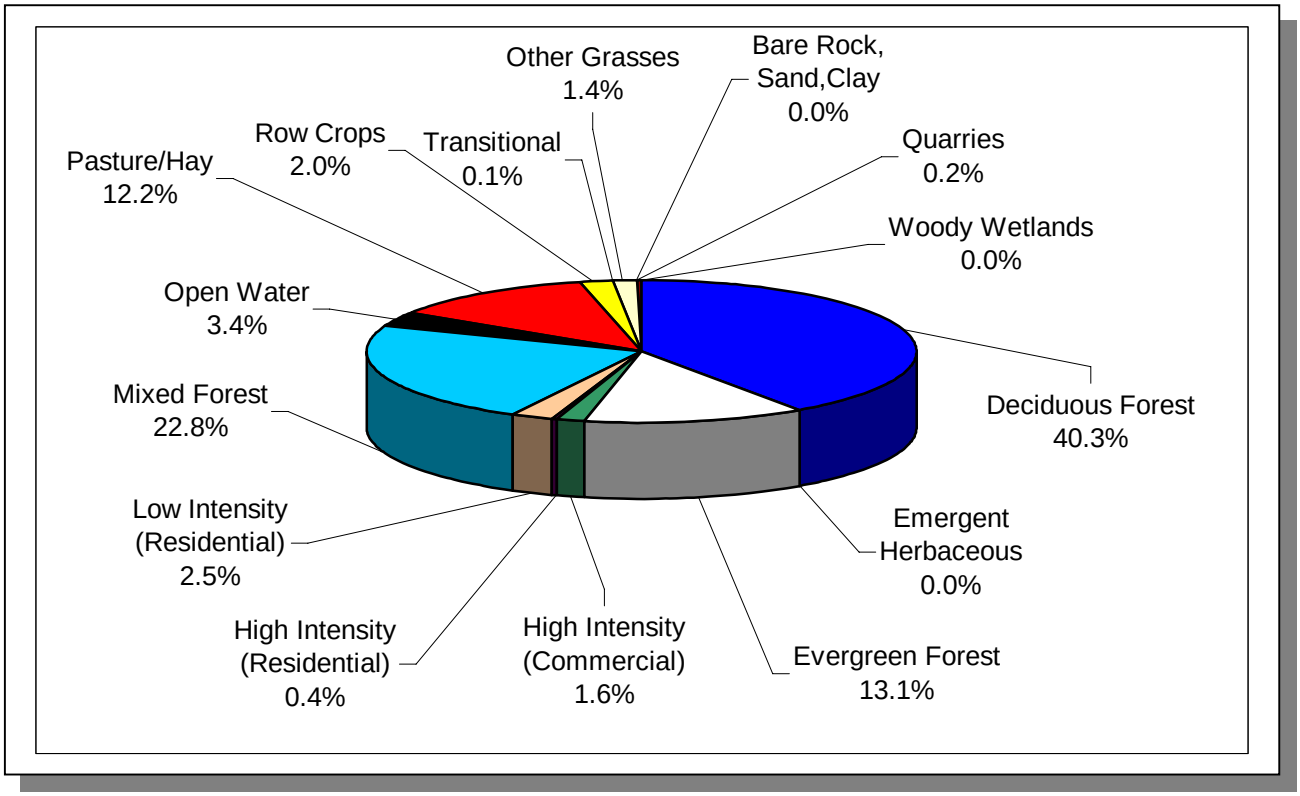

Figure 4-4. Land Use Distribution in Subwatershed 0601020701. *More information is provided in Appendix IV.*

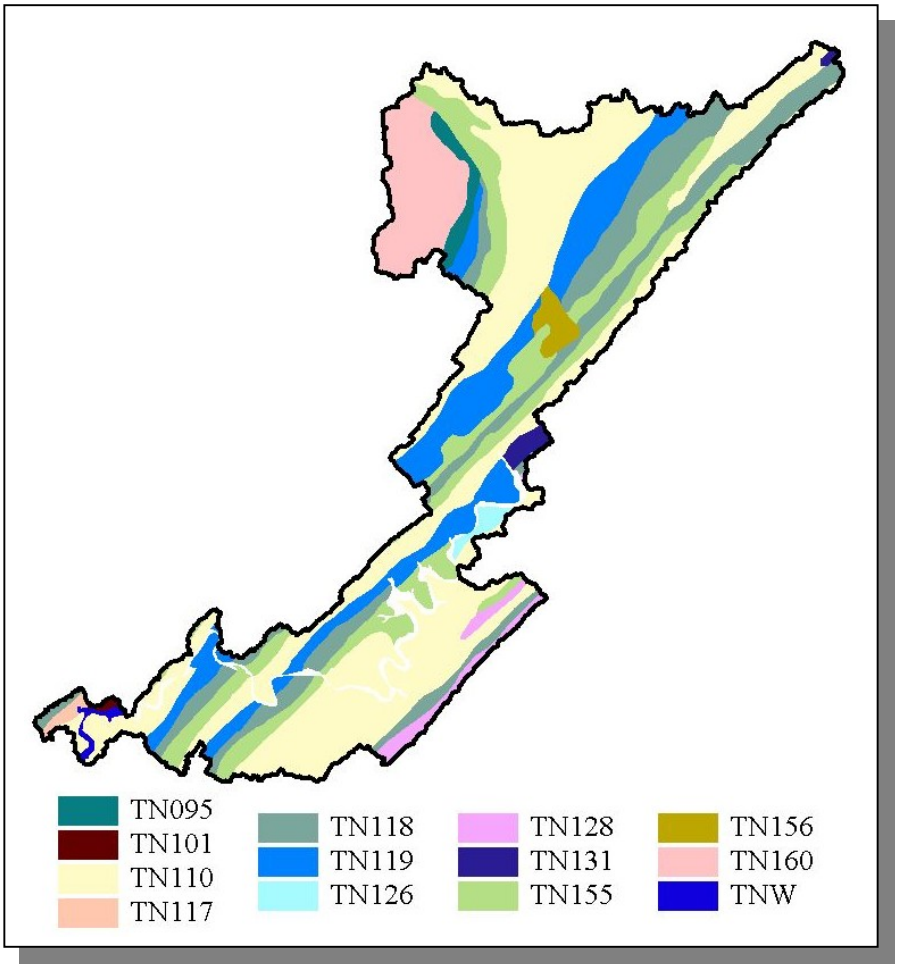

Figure 4-5. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020701.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN095	0.00	B	2.35	5.12	Loam	0.31
TN101	0.00	B	1.71	5.39	Loam	0.35
TN110	0.00	B	2.22	4.96	Loam	0.31
TN117	6.00	C	2.06	5.16	Loam	0.37
TN118	0.00	C	6.52	5.12	Loam	0.29
TN119	2.00	C	1.08	5.15	Loam	0.33
TN126	19.00	C	1.30	5.12	Loam	0.33
TN128	0.00	C	1.30	6.53	Clayey Loam	0.26
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32
TN156	0.00	C	1.41	5.27	Loam	0.33
TN160	0.00	B	2.69	5.36	Loam	0.25

Table 4-2. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020701. *More details are provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Anderson	68,250	71,498	71,330	51.73	35,304	36,984	36,897	4.5
Campbell	35,079	37,878	39,854	1.67	586	632	665	13.5
Knox	335,749	365,900	382,032	4.48	15,029	16,378	17,100	13.8
Loudon	31,255	38,245	39,086	6.87	2,147	2,628	2,685	25.1
Roane	47,227	49,885	51,910	16.71	7,894	8,338	8,676	9.9
Union	13,694	15,956	17,808	5.71	782	912	1,017	30.1
Totals	**531,254**	**579,362**	**602,020**		**61,742**	**65,872**	**67,040**	**8.6**

Table 4-3. Population Estimates in Subwatershed 0601020701.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Clinton	Anderson	8,972	4,006	3,294	700	12
Farragut	Knox	12,804	4,463	3,392	1,064	7
Kingston	Roane	4,552	2,071	1,587	484	0
Lake City	Campbell	2,258	979	930	45	4
Norris	Anderson	1,303	622	505	117	0
Oak Ridge	Roane	27,310	12,694	12,461	212	21
Totals		**57,209**	**24,835**	**22,169**	**2,622**	**44**

Table 4-4. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601020701.

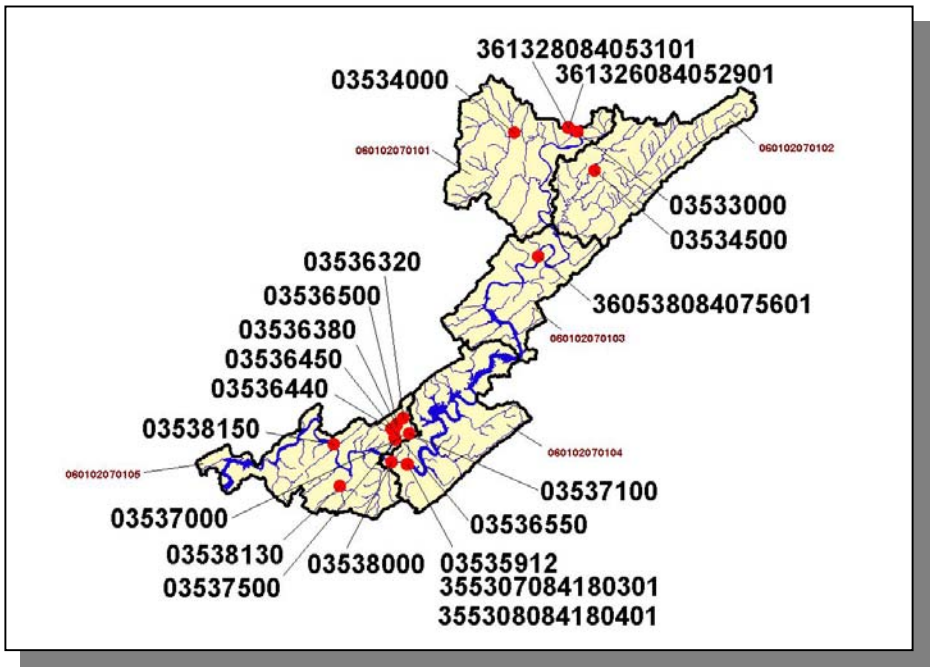

Figure 4-6. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070102, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information is provided in Appendix IV.*

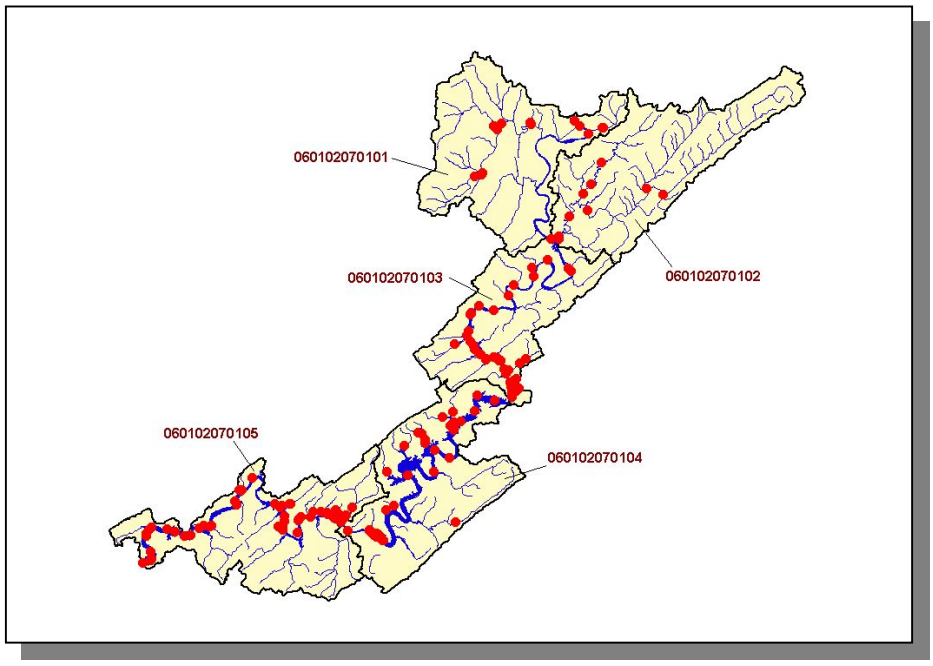

Figure 4-7. Location of STORET Monitoring Sites in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070102, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.A.ii Point Source Contributions.

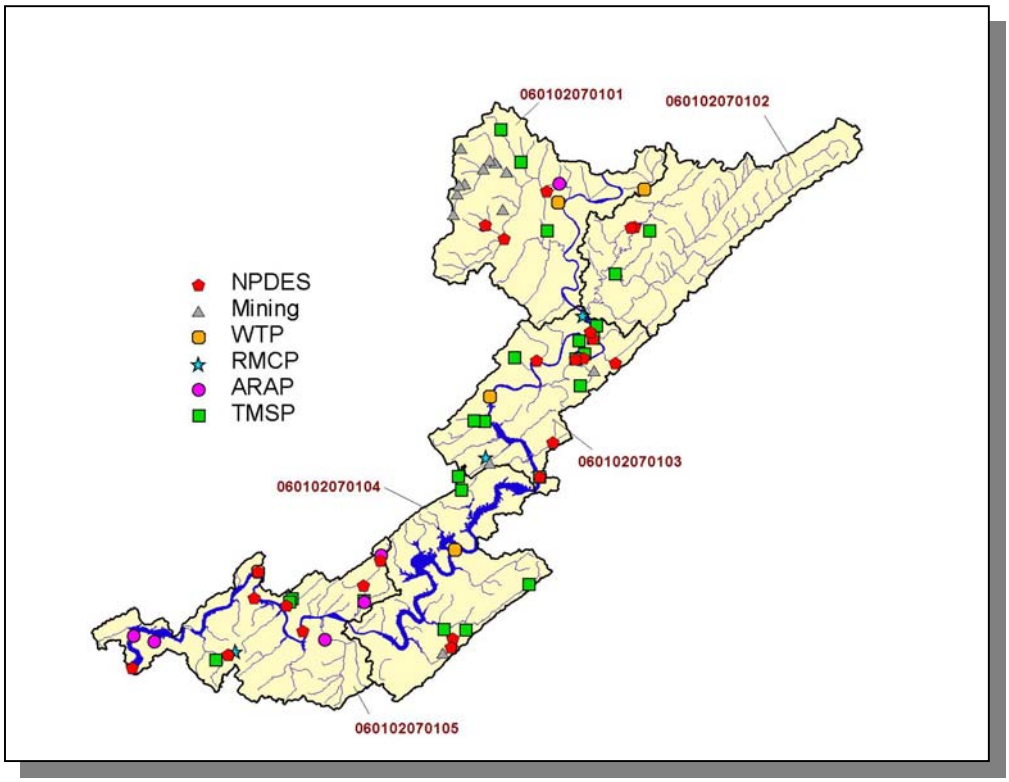

Figure 4-8. Location of Active Point Source Facilities in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

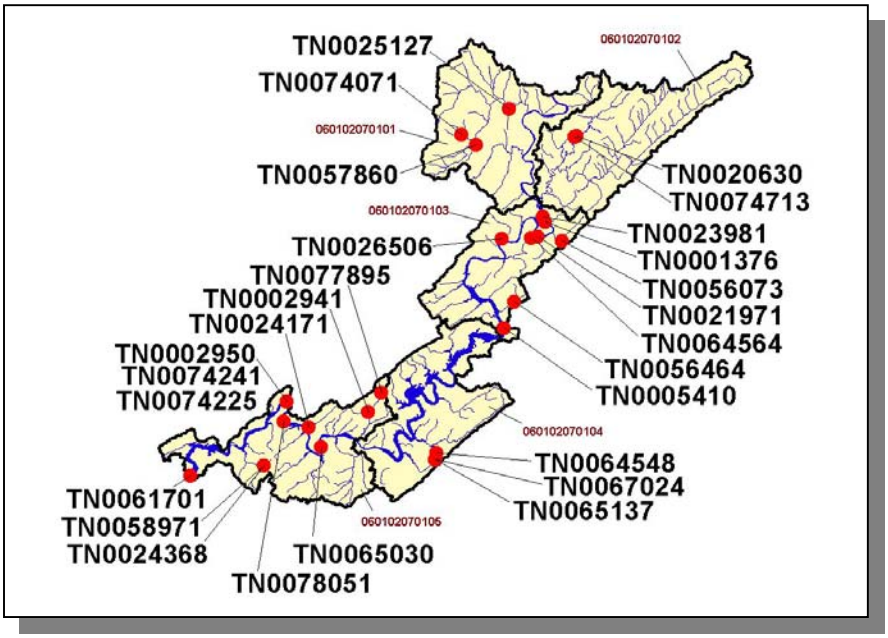

Figure 4-9. Location of NPDES Facilities in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

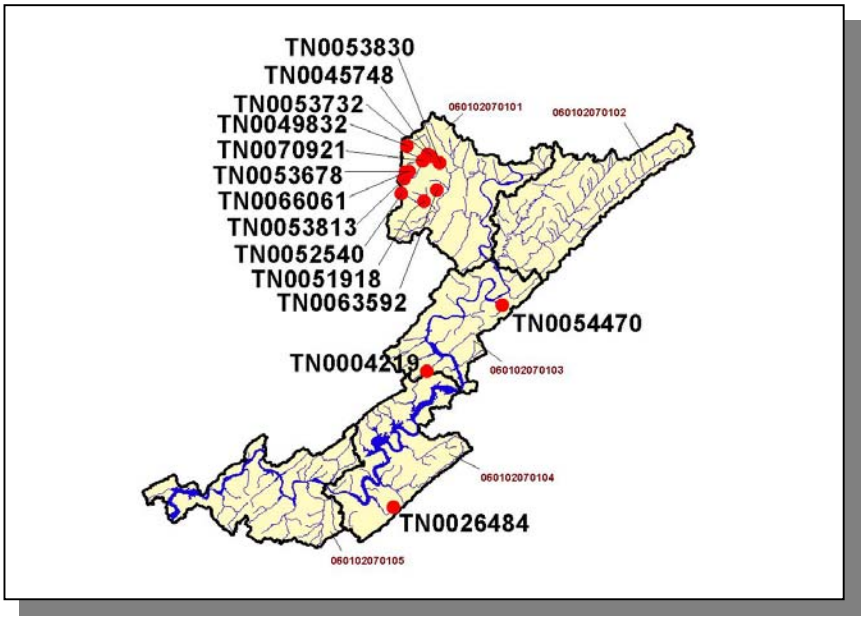

Figure 4-10. Location of Active Mining Facilities in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

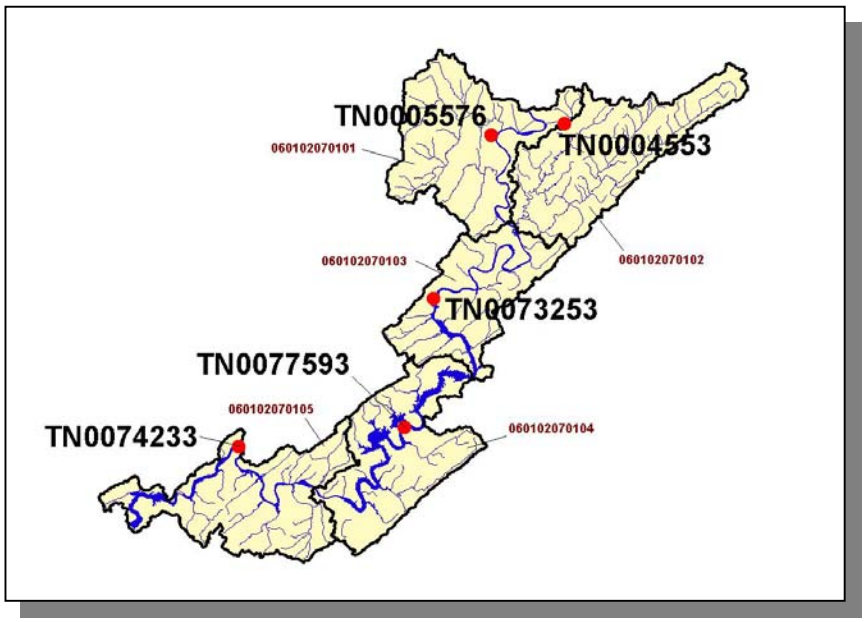

Figure 4-11. Location of Water Treatment Plants in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

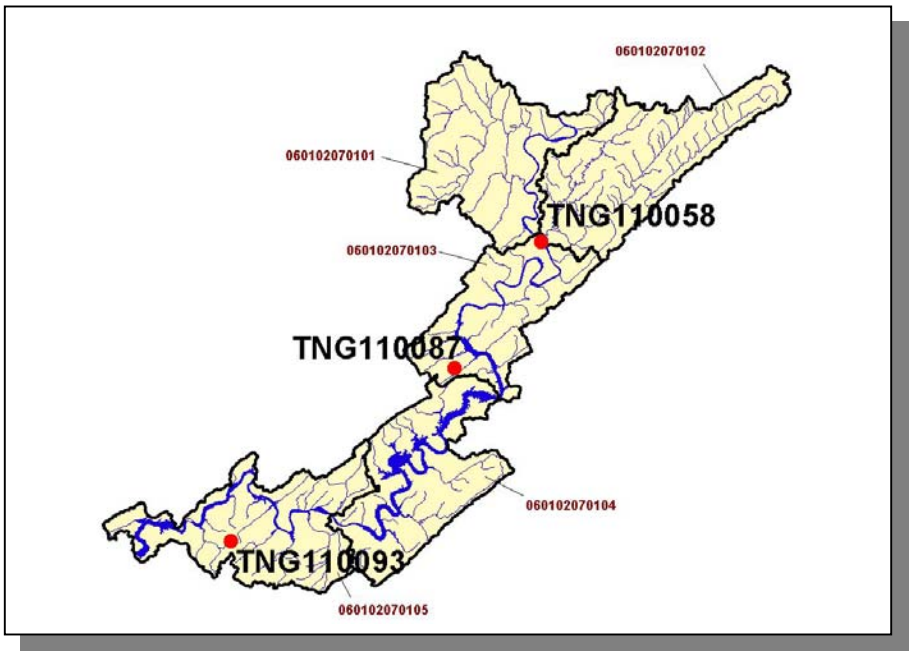

Figure 4-12. Location of Ready Mix Concrete Plants in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

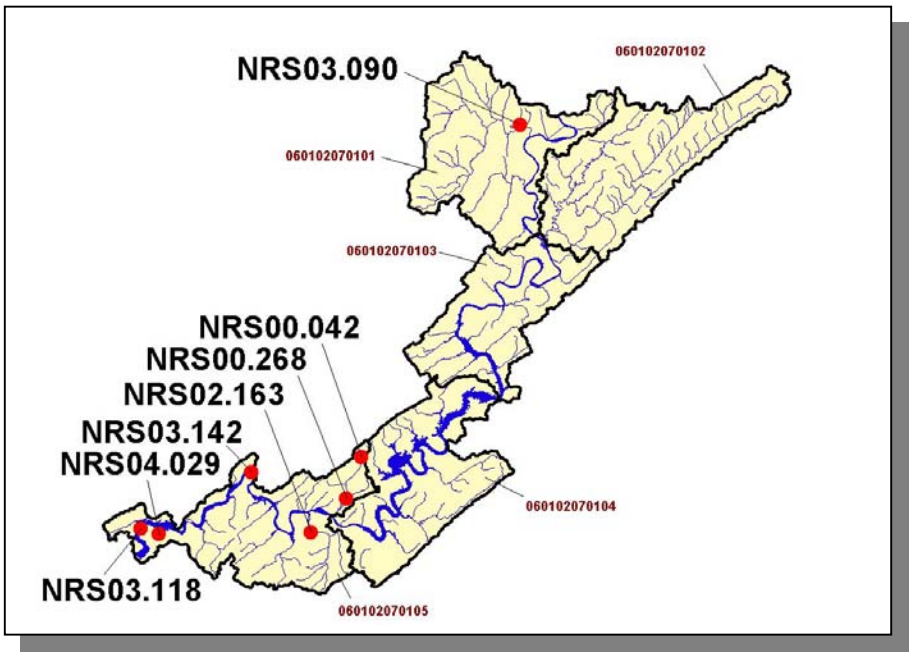

Figure 4-13. Location of ARAP Sites (Individual Permits) in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

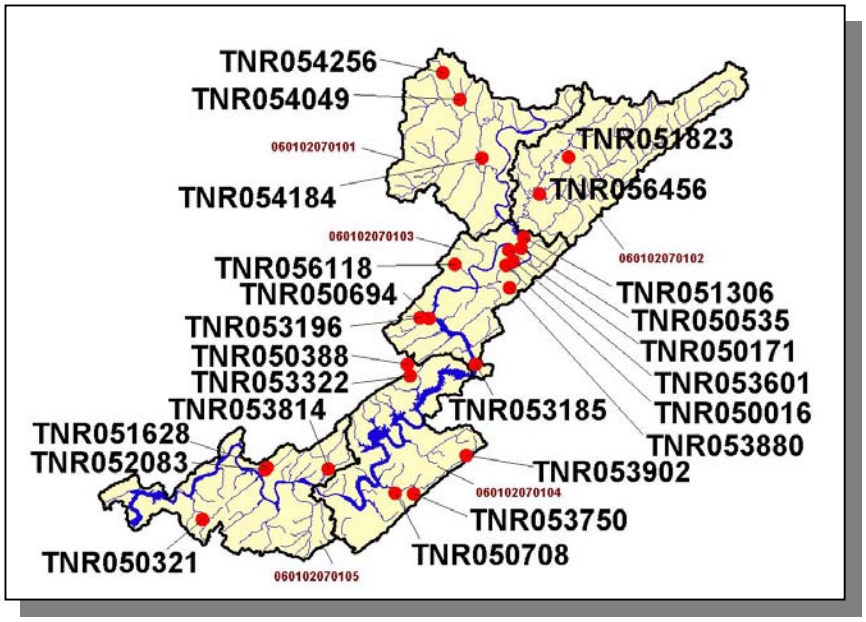

Figure 4-14. Location of TMSP Facilities in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.A.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There are five NPDES facilities discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0601020701:

- TN0020630 (Norris STP) discharges to Buffalo Creek @ RM 4.4
- TN0074713 (Intex Enterprises) discharges to Buffalo Creek @ RM 0.3 to Hinds Creek @ RM 5.5
- TN0025127 (Lake City STP) discharges to Coal Creek @ RM 3.3
- TN0065137 (Knoxville Travel Center) discharges to Grable Branch @ RM 0.8
- TN0002941 (USDOE-ORNL) discharges to White Oak Creek, Clinch River, and Melton Branch

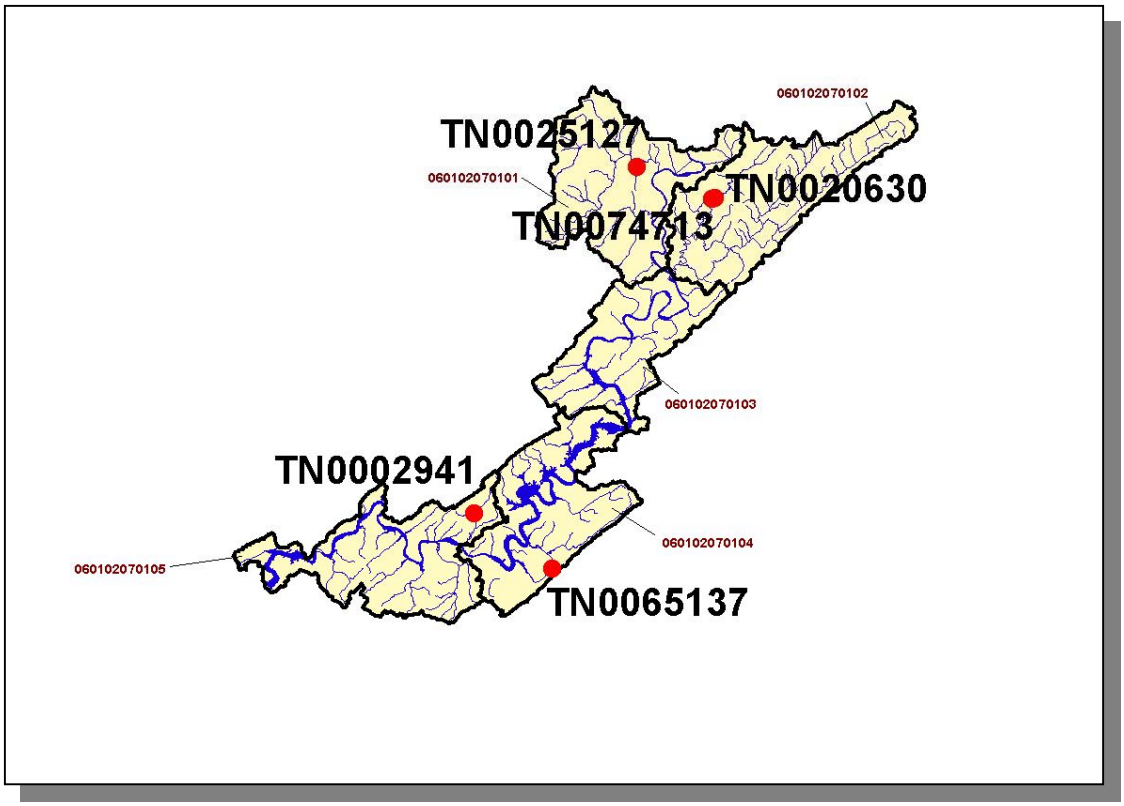

Figure 4-15. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0601020701. *Subwatershed 060102070101, 060102070021, 060102070103, 060102070104, and 060102070105 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0020630	0.33	0.33	0.34	0.30	0.2
TN0074713				0	0.324
TN0025127	0.80	0.82	0.87	0.74	0.95
TN0065137					
TN0002941	2.7	2.8	3.1	2.6	

Table 4-5. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020701. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	$CBOD_5$	BENZENE
TN0065137	X	X

Table 4-6. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020701.

PERMIT #	WET	$CBOD_5$	FECAL COLIFORM	*E. COLI*	NH_3	TRC	TSS	SETTLEABLE SOLIDS	CN	DO	pH
TN0020630		X	X	X	X	X	X	X		X	X
TN0074713	X	X			X		X		X		X
TN0025127		X	X	X	X	X	X	X		X	X
TN0065137							X				X
TN0002941	X	X			X		X		X		X

Table 4-7. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020701. *WET, Whole Effluent Toxicity; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids.*

PERMIT #	Zn	Ag	Ni	Pb	Cu	Cr	Cd
TN0074713	X	X	X	X	X	X	
TN0002941	X	X	X	X	X	X	X

Table 4-8. Metals Monitored for Daily Maximum) Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020701.

PERMIT #	OIL and GREASE	TTO
TN0074713		X
TN0065137	X	
TN0002941	X	X

Table 4-9. Organic Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020701. *TTO, Total Toxic Organics.*

4.2.A.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
7,431	15,720	914	37	<5	93	210

Table 4-10. Summary of Livestock Count Estimates in Subwatershed 0601020701. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Anderson	124.0	124.0	2.6	6.2
Campbell	250.3	250.2	2.6	10.6
Knox	127.5	127.0	2.2	8.2
Loudon	62.3	62.3	1.1	3.5
Roane	153.1	153.1	1.7	5.1
Union	102.5	102.5	0.1	0.0
Total	**819.7**	**819.1**	**10.3**	**33.6**

Table 4-11. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0601020701.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.54
Legumes (Pastureland)	0.23
Legumes (Hayland)	1.04
Grass (Hayland)	0.80
Legumes, Grass (Hayland)	2.18
Grass, Forbs, Legumes (Mixed Pasture)	1.30
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	1.95
Soybeans (Row Crops)	15.54
Tobacco (Row Crops)	2.29
Wheat (Close-Grown Cropland)	3.74
Other Vegetable and Truck Crops	11.67
Non-Agricultural Land Use	0.00
Other Land in Farms	0.23
Farmsteads and Ranch Headquarters	0.99

Table 4-12. Annual Estimated Total Soil Loss in Subwatershed 0601020701.

4.2.B. 0601020702 (Bull Run Creek).

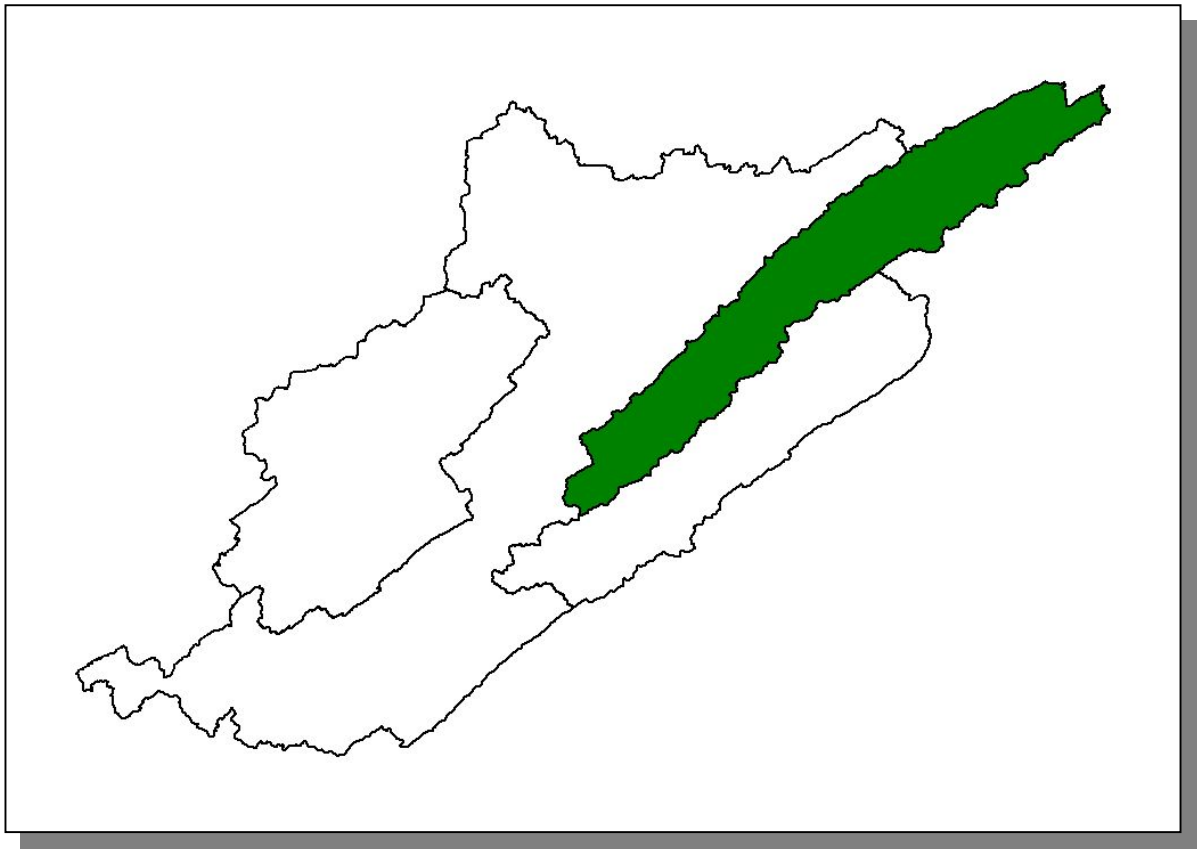

Figure 4-16. Location of Subwatershed 0601020702. *All Lower Clinch River HUC-10 subwatershed boundaries are shown for reference.*

4.2.B.i. General Description.

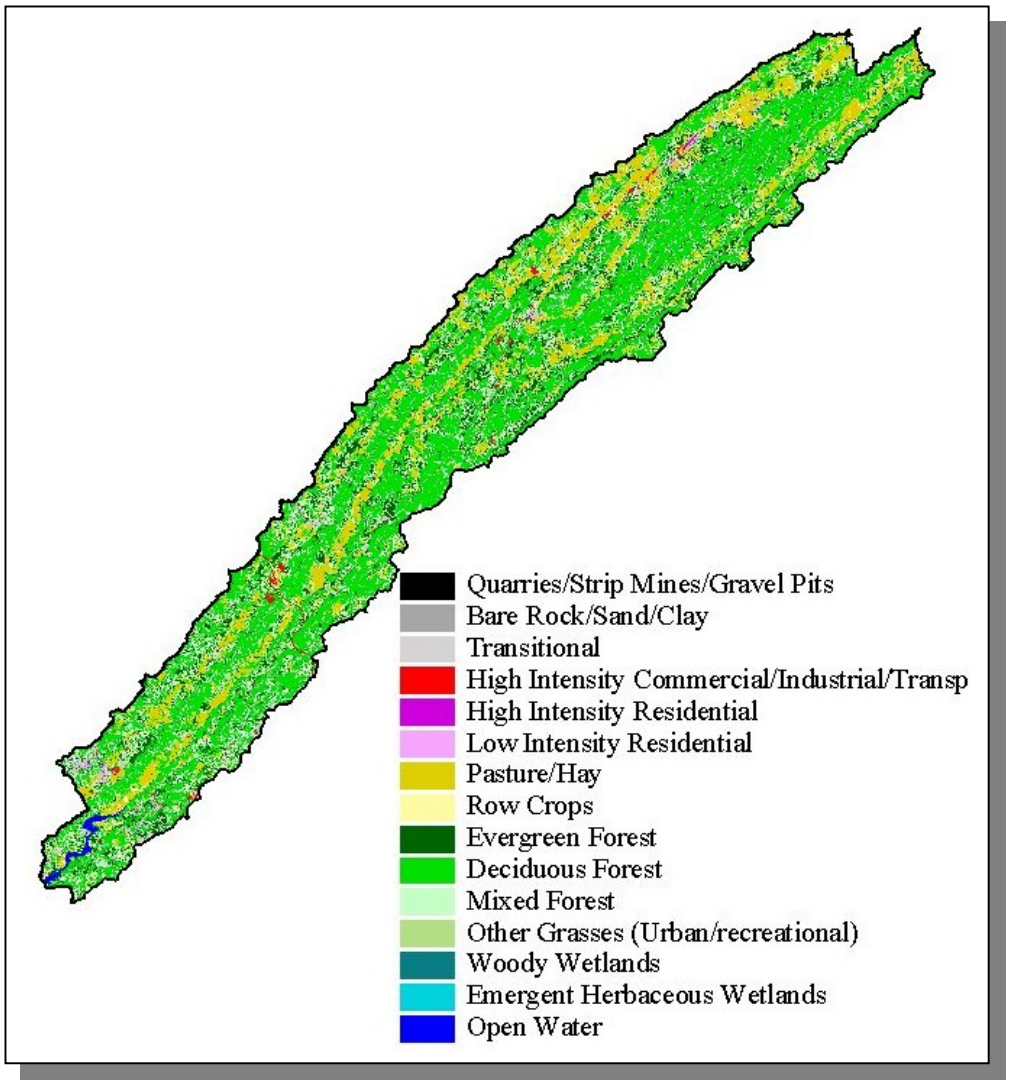

Figure 4-17. Illustration of Land Use Distribution in Subwatershed 0601020702.

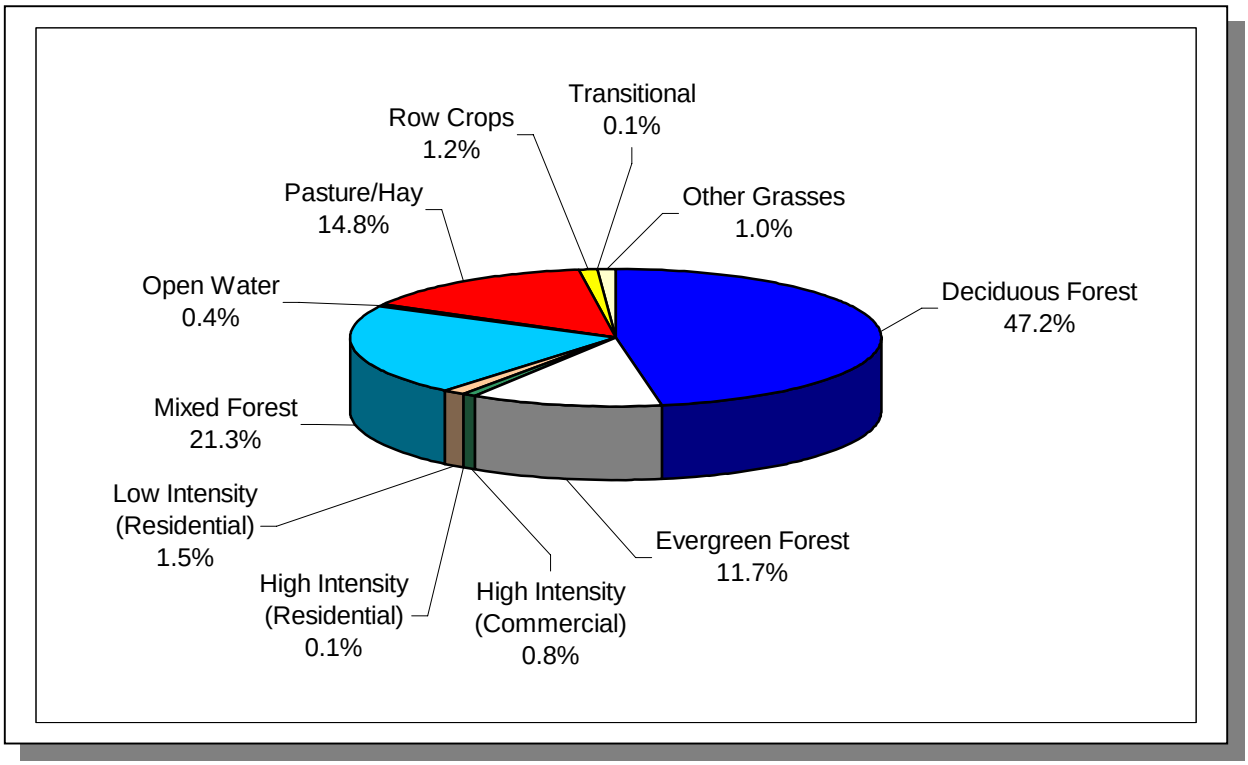

Figure 4-18. Land Use Distribution in Subwatershed 0601020702. *More information is provided in Appendix IV.*

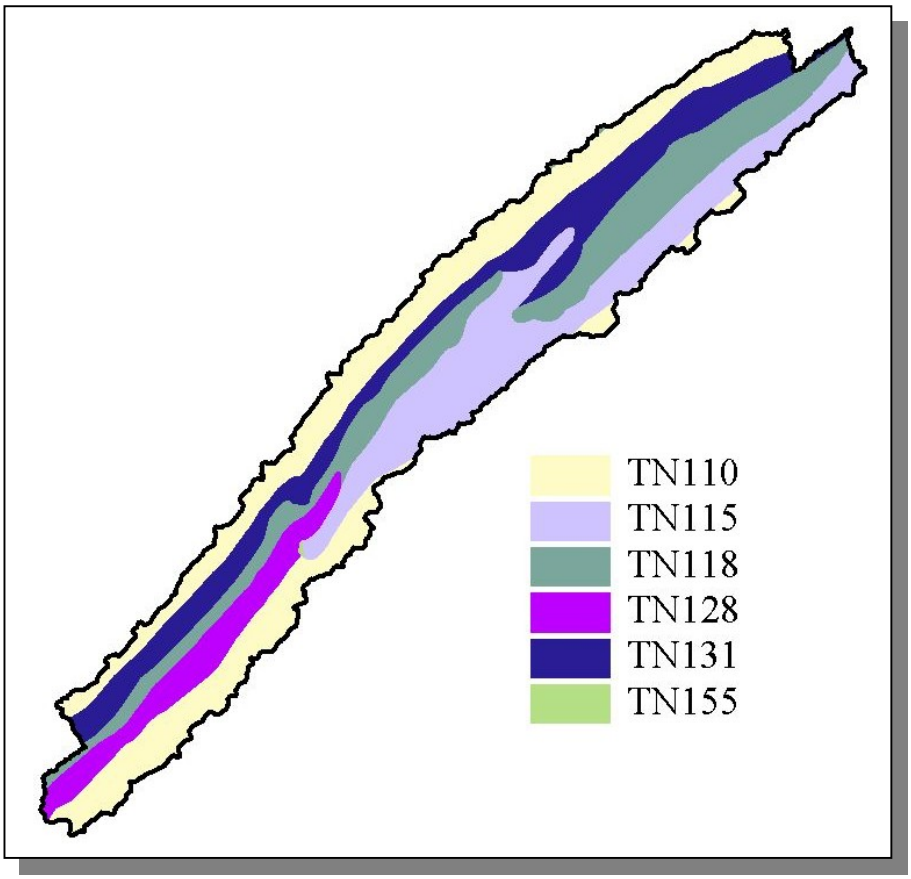

Figure 4-19. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020702.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN115	0.00	C	1.41	5.15	Silty Loam	0.36
TN118	0.00	C	6.52	5.12	Loam	0.29
TN128	0.00	C	1.30	6.53	Clayey Loam	0.26
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-13. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020702. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Anderson	68,250	71,498	71,330	4.10	2,795	2,928	2,921	4.5
Grainger	17,095	19,456	20,659	0.55	94	107	113	20.2
Knox	335,749	365,900	382,032	7.90	26,529	28,912	30,186	13.8
Union	13,694	15,956	17,808	19.63	2,688	3,132	3,496	30.1
Totals	**434,788**	**472,810**	**491,829**		**32,106**	**35,079**	**36,716**	**14.4**

Table 4-14. Population Estimates in Subwatershed 0601020702

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Luttrell	Union	812	303	4	274	25
Maynardville	Union	1,298	544	366	173	5
Plainview	Union	2,165	853	50	789	14
Totals		**4,275**	**1,700**	**420**	**1,236**	**44**

Table 4-15. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601020702.

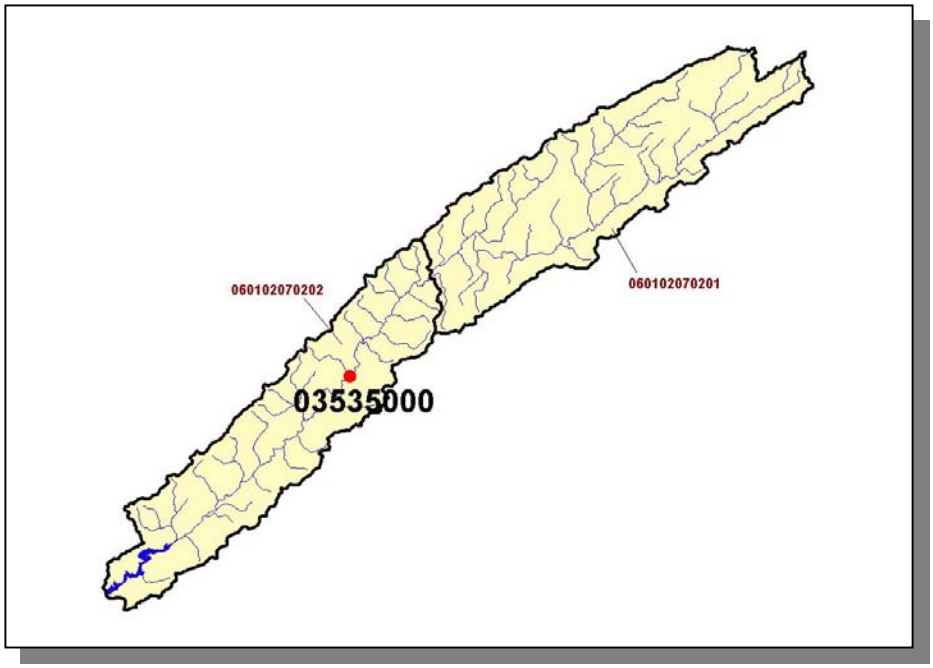

Figure 4-20. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information is provided in Appendix IV.*

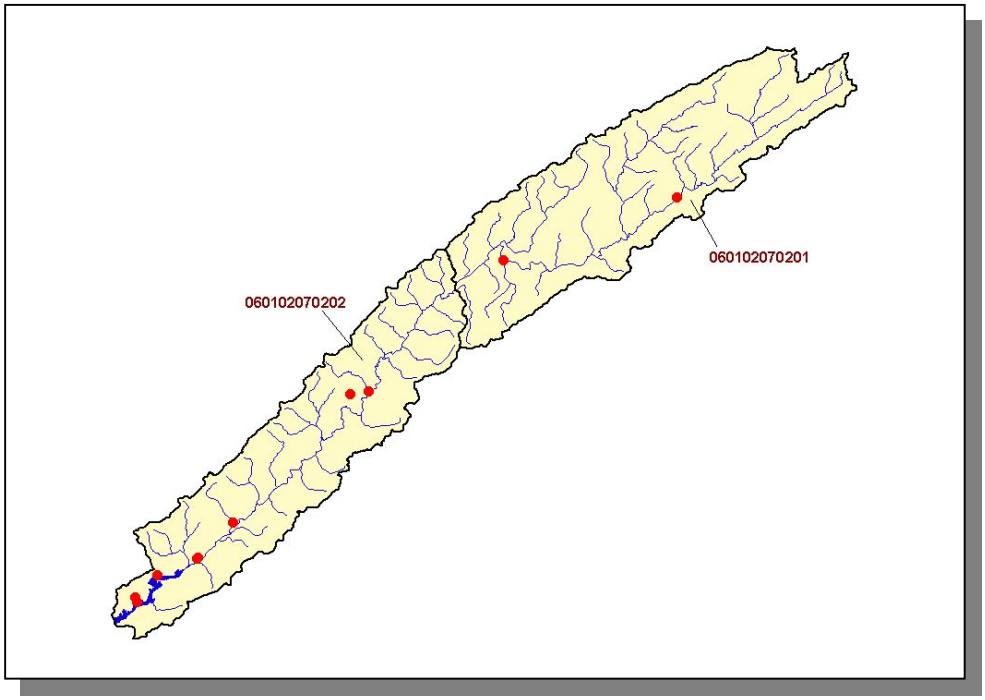

Figure 4-21. Location of STORET Monitoring Sites in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.B.ii. Point Source Contributions.

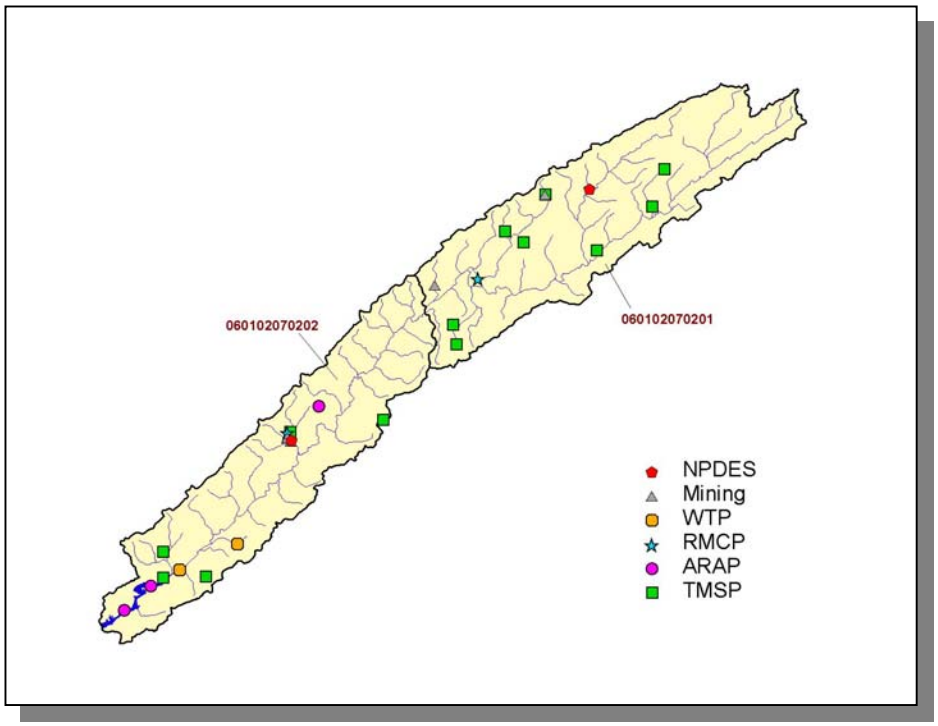

Figure 4-22. Location of Active Point Source Facilities in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

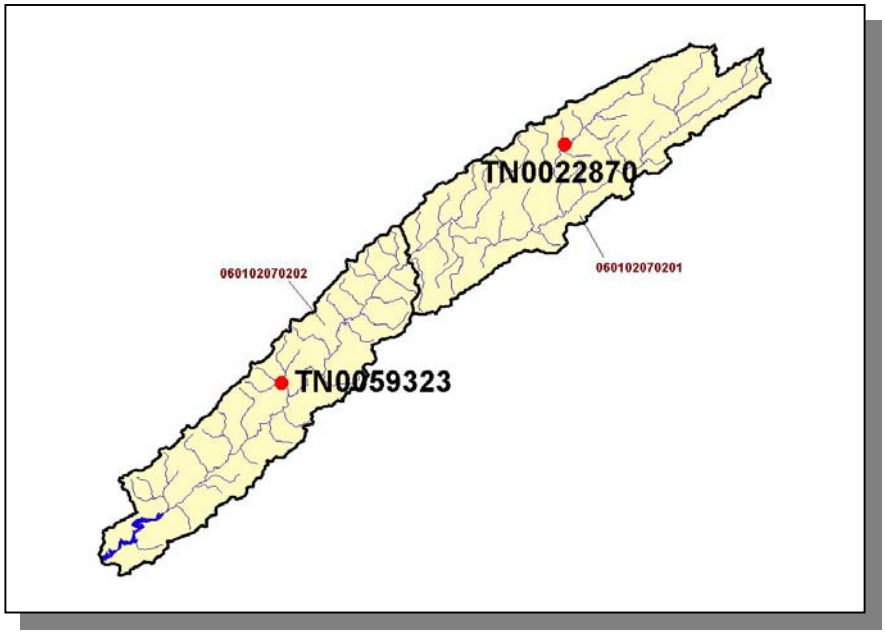

Figure 4-23. Location of NPDES Facilities in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

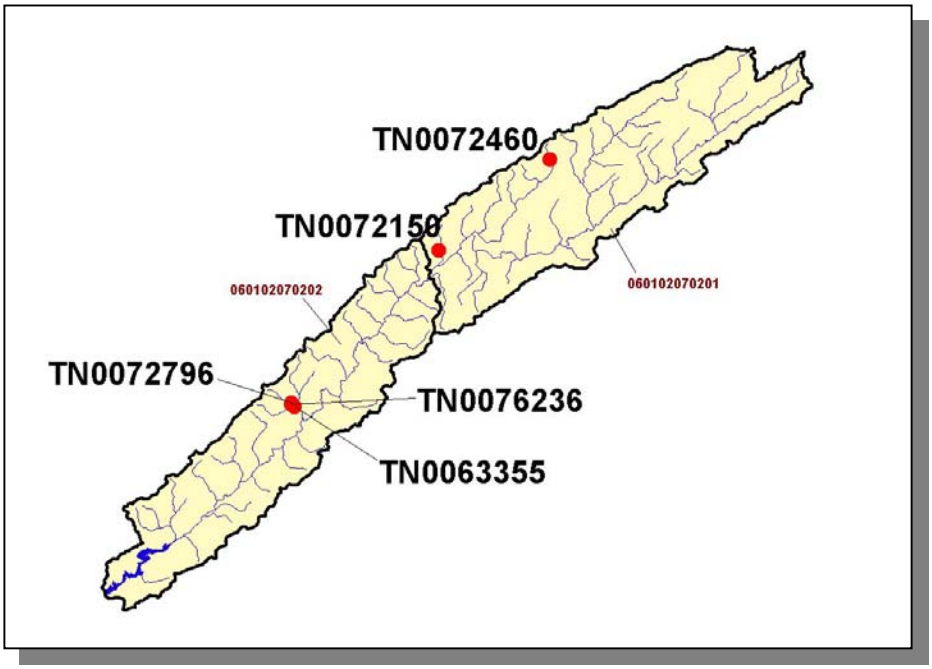

Figure 4-24. Location of Active Mining Facilities in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

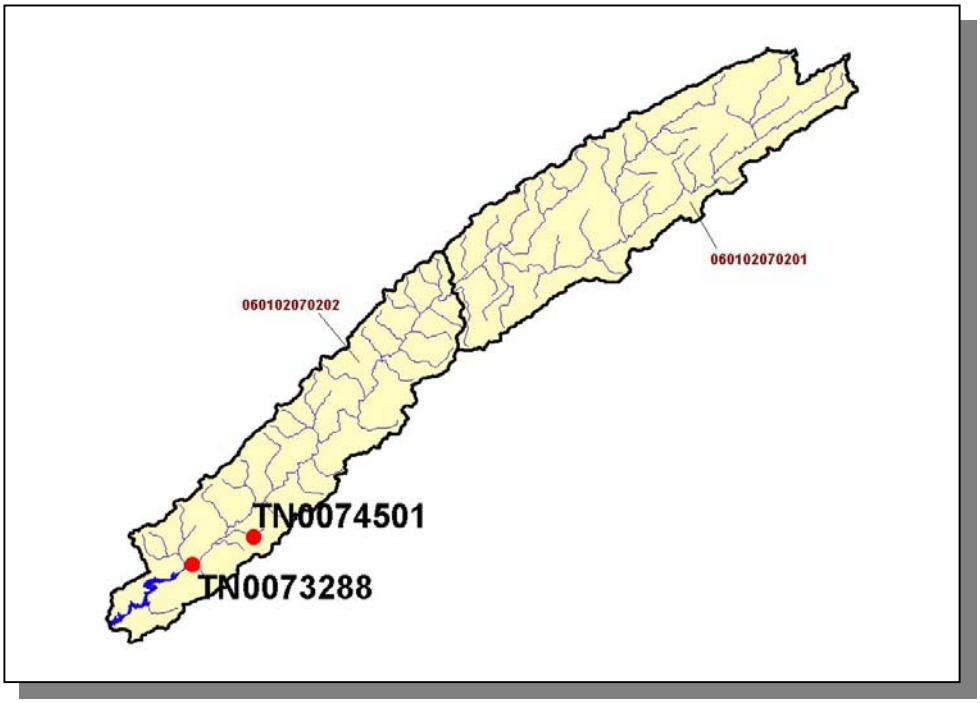

Figure 4-25. Location of Water Treatment Plants in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

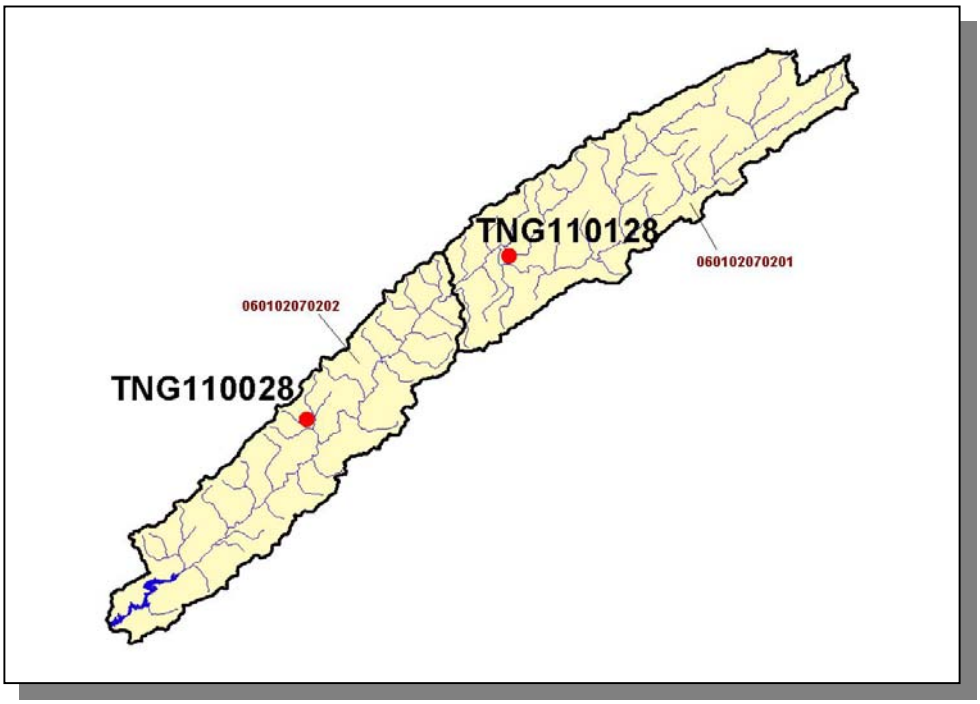

Figure 4-26. Location of Ready Mix Concrete Plants in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

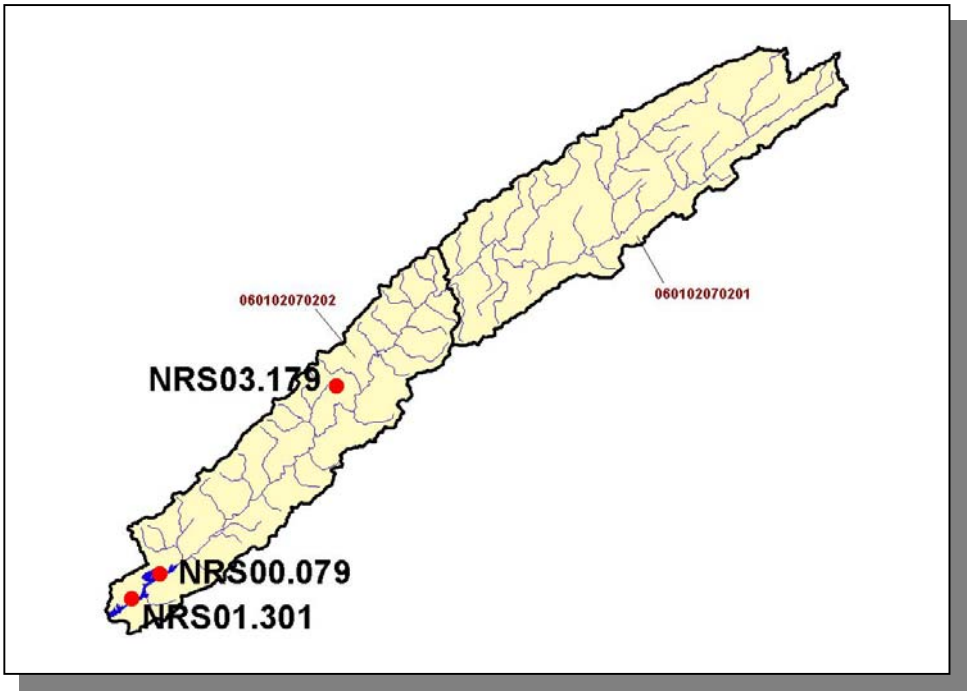

Figure 4-27. Location of ARAP Sites (Individual Permits) in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

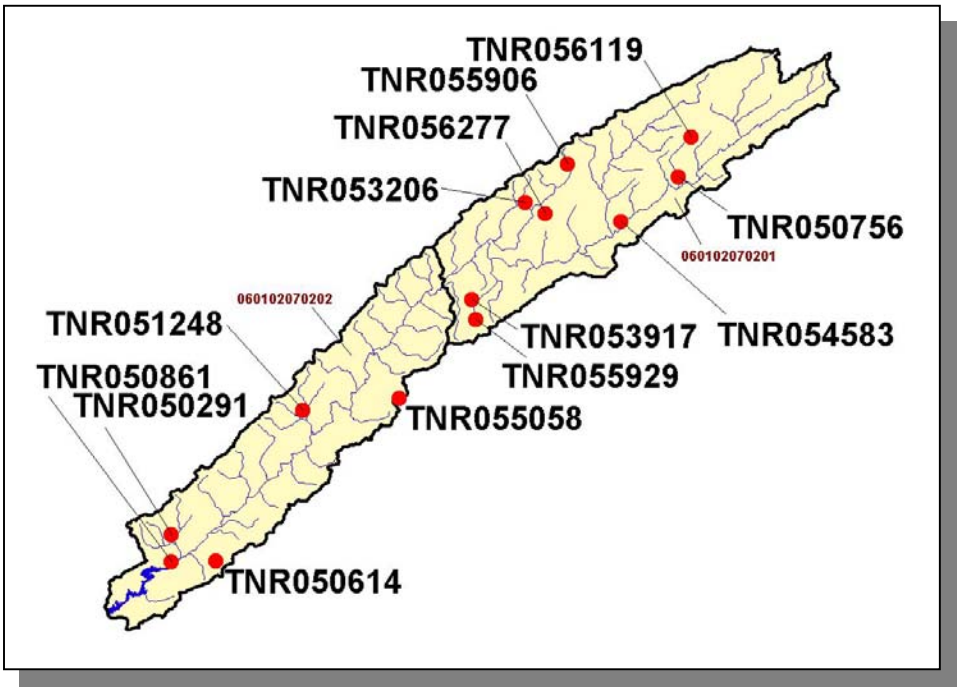

Figure 4-28. Location of TMSP Facilities in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.B.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There are two NPDES facilities discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0601020702:

- TN0022870 (Maynardville STP) discharges to North Fork Bull Run Creek @ RM 3.1
- TN0059323 (Hallsdale-Powell Raccoon Valley STP) discharges to Bull Run Creek @ RM 12.6

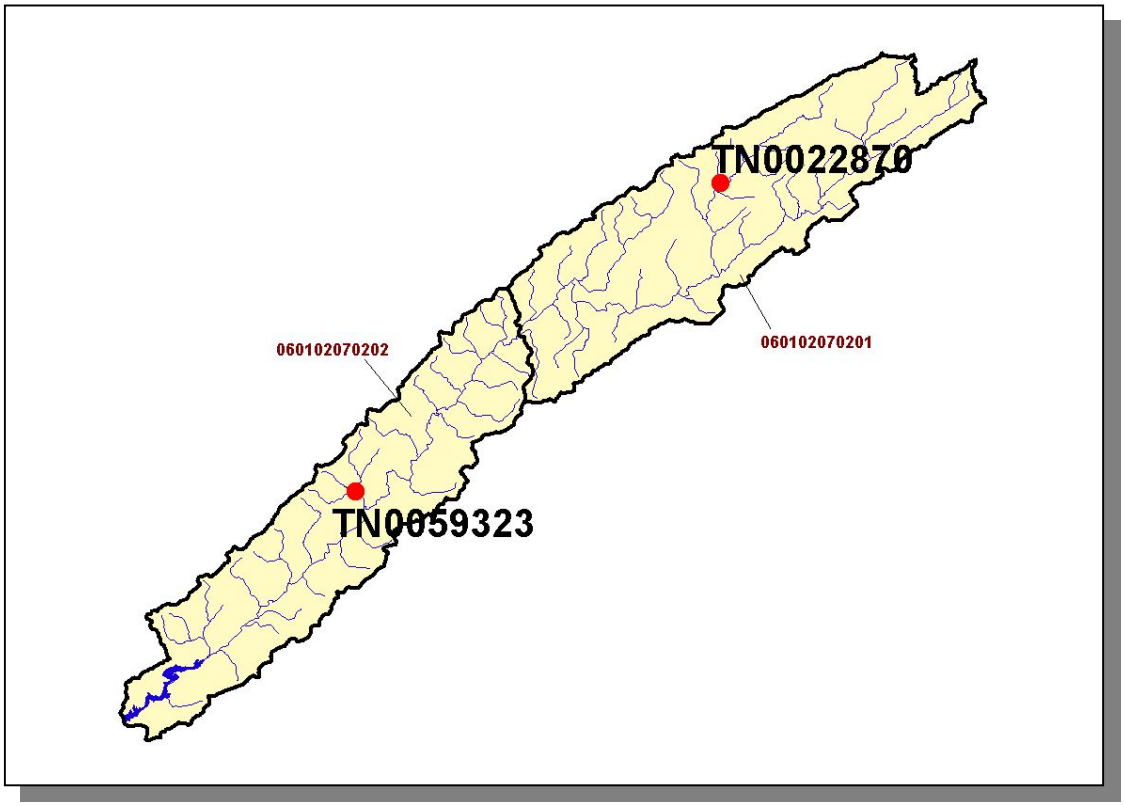

Figure 4-29. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0601020702. *Subwatershed 060102070201 and 060102070202 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0022870	0.50	0.52	0.56	0.47	0.6
TN0059323	4.76	4.90	5.29	4.50	0.3

Table 4-16. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020702. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	$CBOD_5$	FECAL COLIFORM	*E. COLI*	NH_3	TRC	TSS	SETTLEABLE SOLIDS	DO	pH
TN0022870	X	X	X	X	X	X	X	X	X
TN0059323	X	X	X	X	X	X	X	X	X

Table 4-17. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020702. *$CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids.*

4.2.B.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
2,981	5,807	115	12	<5	83	76

Table 4-18. Summary of Livestock Count Estimates in Subwatershed 0601020702. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Anderson	124.0	124.0	2.6	6.2
Grainger	102.6	102.6	0.3	1.8
Knox	127.5	127.0	2.2	8.2
Union	102.5	102.5	0.1	0.0
Total	**456.6**	**456.1**	**5.2**	**16.2**

Table 4-19. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601020702.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.77
Legumes (Hayland)	1.07
Grass (Hayland)	1.02
Legumes, Grass (Hayland)	1.02
Grass, Forbs, Legumes (Mixed Pasture)	1.18
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	1.28
Soybeans (Row Crops)	15.54
Tobacco (Row Crops)	2.22
Wheat (Close-Grown Cropland)	4.44
Other Vegetable and Truck Crops	12.06
Non-Agricultural Land Use	0.00
Other Land in Farms	0.23
Farmsteads and Ranch Headquarters	0.32

Table 4-20. Annual Estimated Total Soil Loss in Subwatershed 0601020702.

4.2.C. 0601020703 (Beaver Creek).

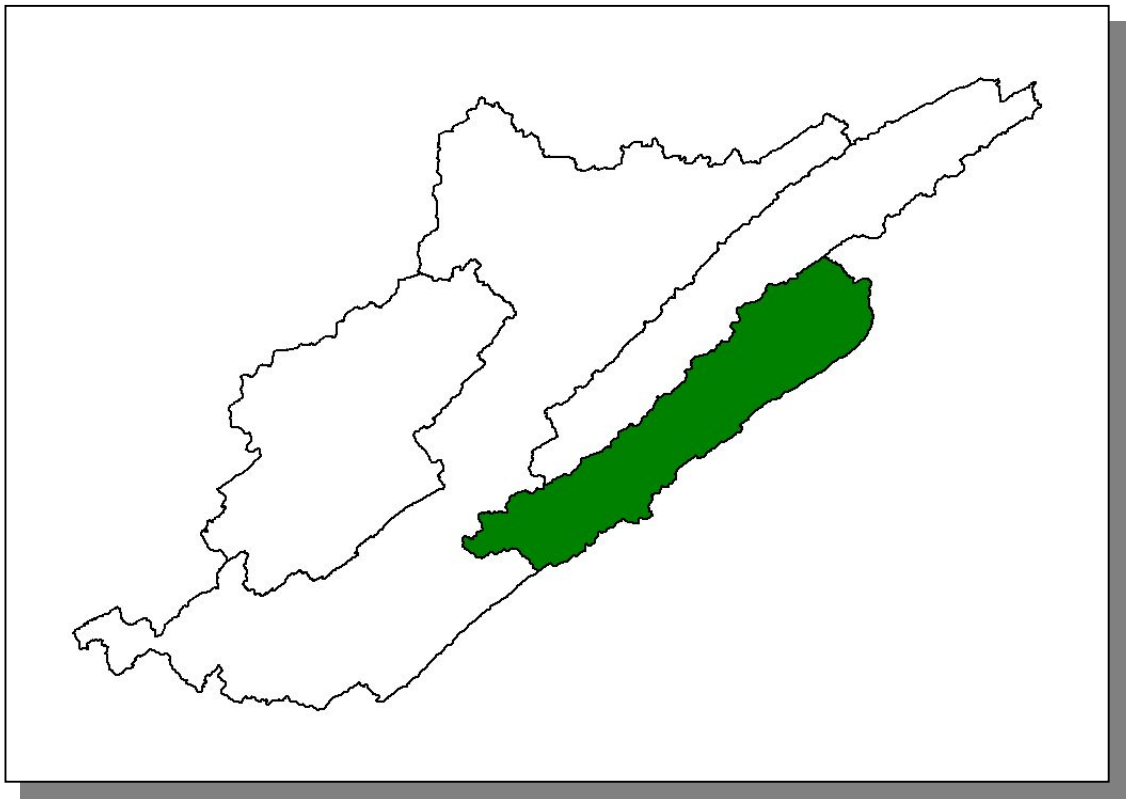

Figure 4-30. Location of Subwatershed 0601020703. *All Lower Clinch River HUC-10 subwatershed boundaries are shown for reference.*

4.2.C.i. General Description.

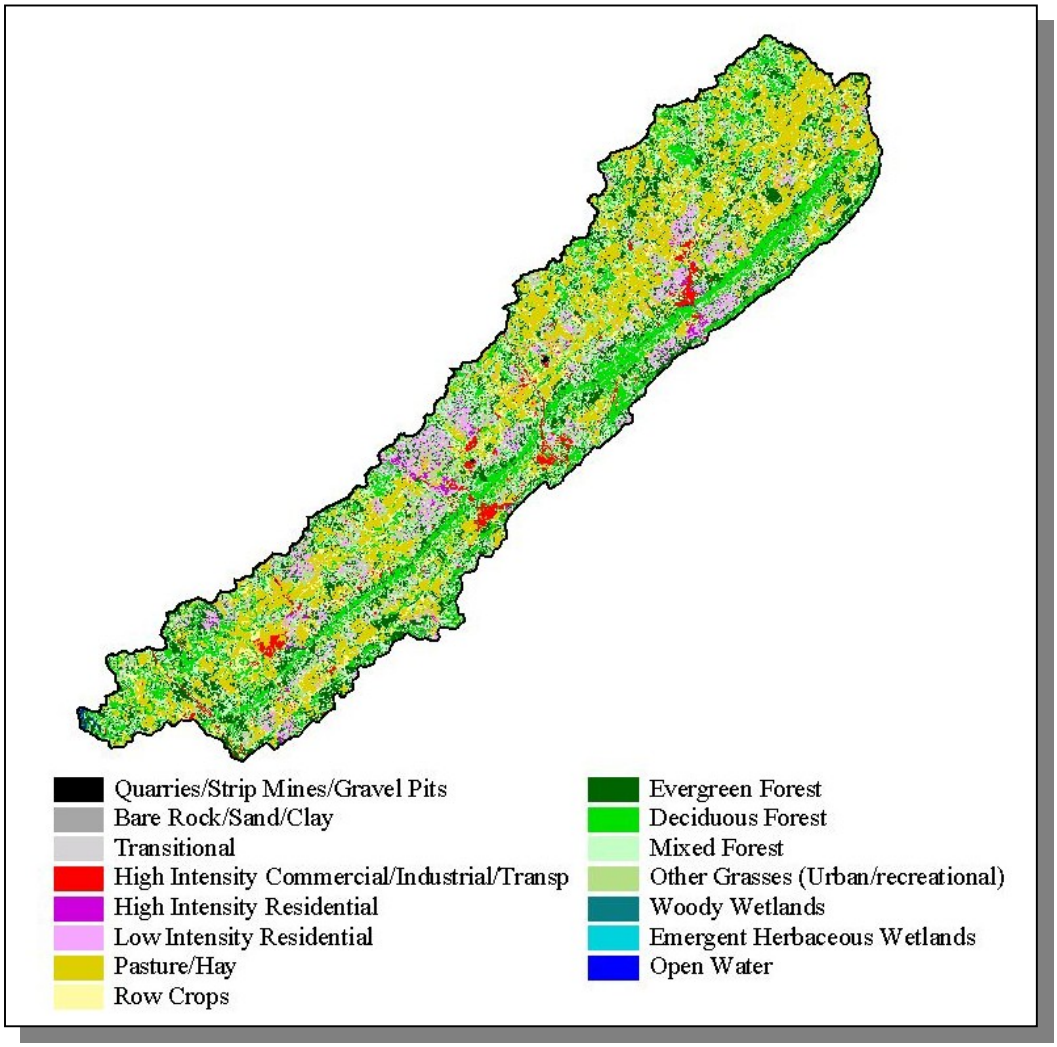

Figure 4-31. Illustration of Land Use Distribution in Subwatershed 0601020703.

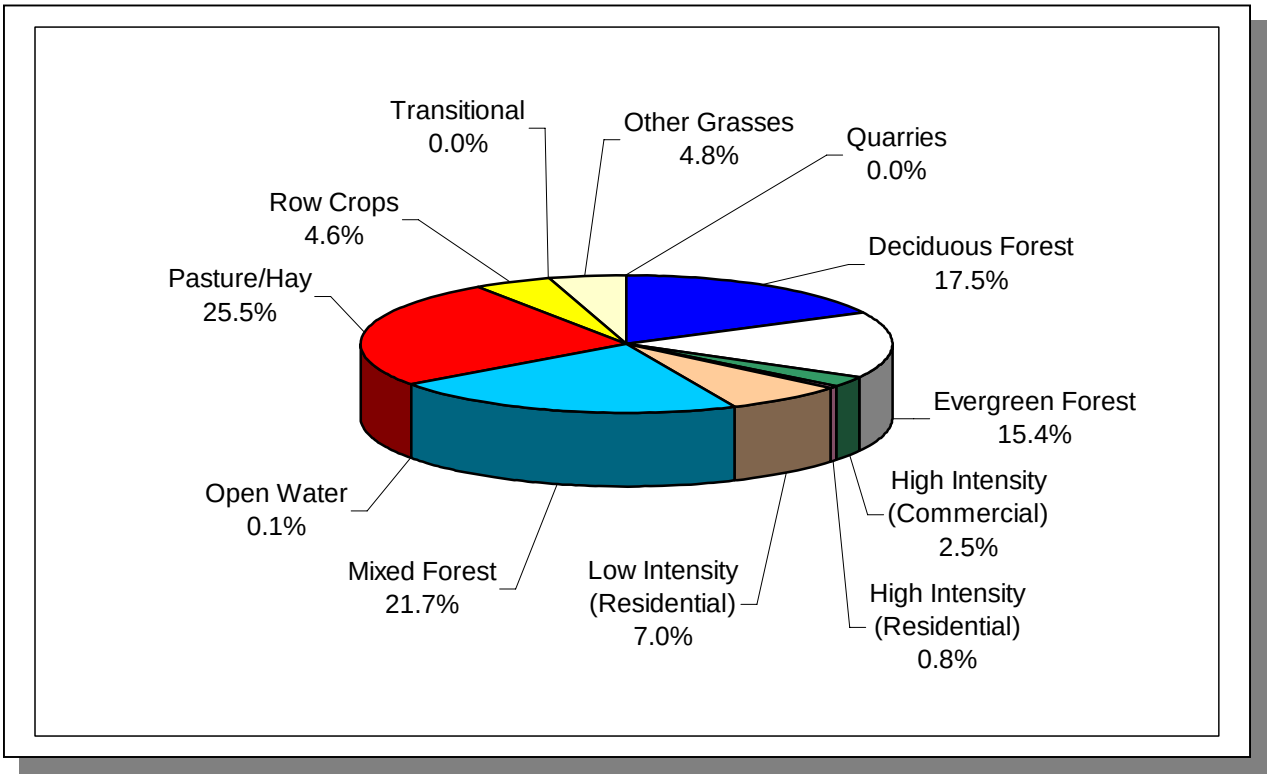

Figure 4-32. Land Use Distribution in Subwatershed 0601020703. *More information is provided in Appendix IV.*

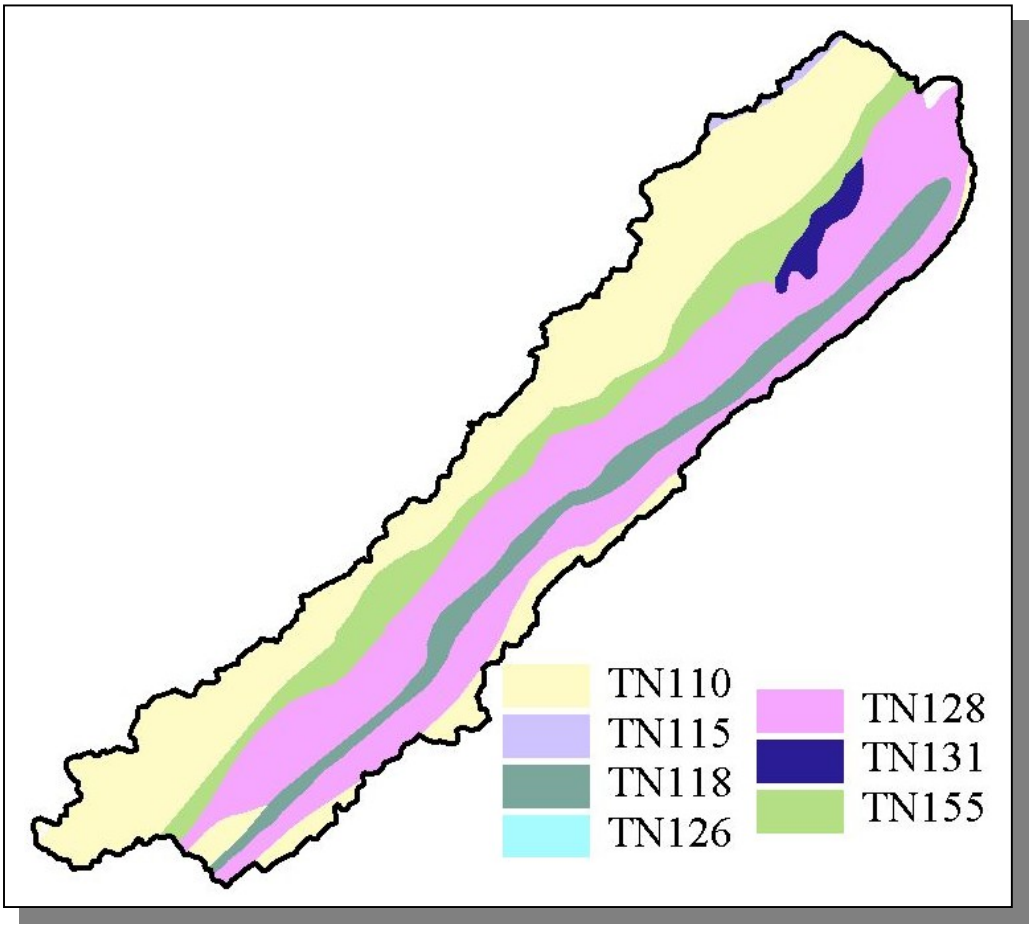

Figure 4-33. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020703.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hour)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN110	0.00	B	2.22	4.96	Loam	0.31
TN115	0.00	C	1.41	5.15	Silty Loam	0.36
TN118	0.00	C	6.52	5.12	Loam	0.29
TN126	19.00	C	1.30	5.12	Loam	0.33
TN128	0.00	C	1.30	6.53	Clayey Loam	0.26
TN131	0.00	C	1.17	4.95	Silty Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32

Table 4-21. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020703. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Anderson	68,250	71,498	71,330	0.08	56	59	59	5.4
Knox	335,749	365,900	382,032	17.11	57,457	62,617	65,378	13.8
Totals	**403,999**	**437,398**	**453,362**		**57,513**	**62,678**	**65,437**	**13.8**

Table 4-22. Population Estimates in Subwatershed 0601020703.

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Knoxville	Knox	165,121	76,453	74,884	1,521	48

Table 4-23. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601020703.

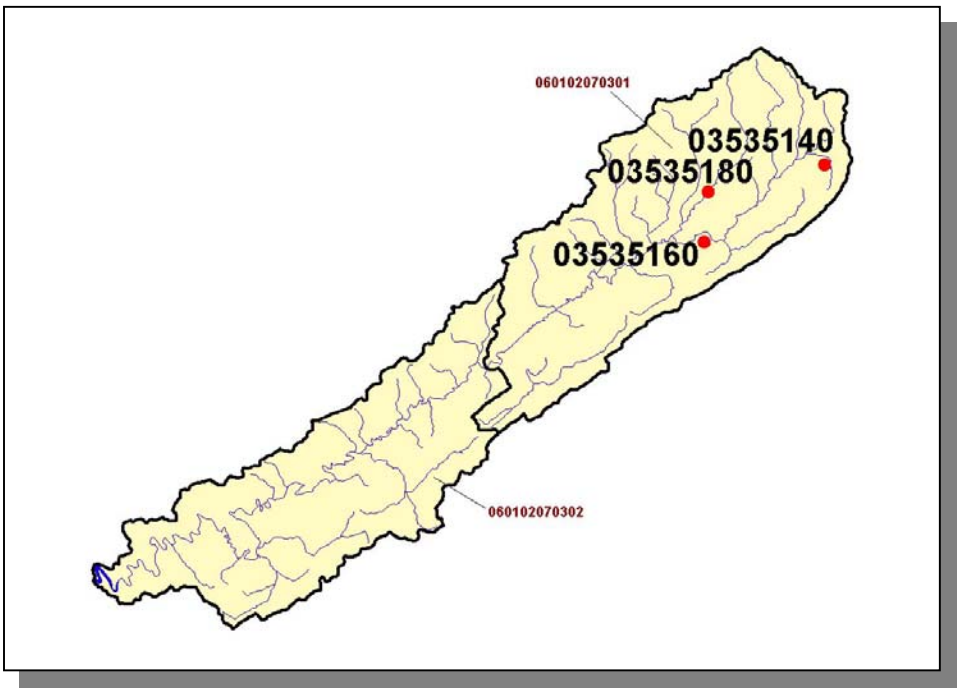

Figure 4-34. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information is provided in Appendix IV.*

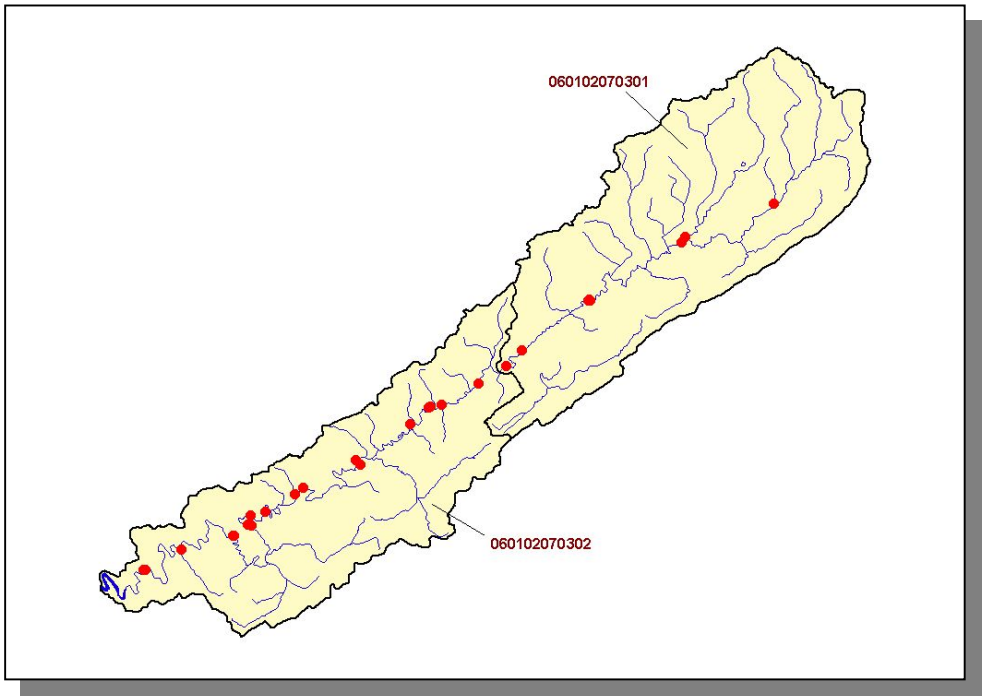

Figure 4-35. Location of STORET Monitoring Sites in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.C.ii. Point Source Contributions.

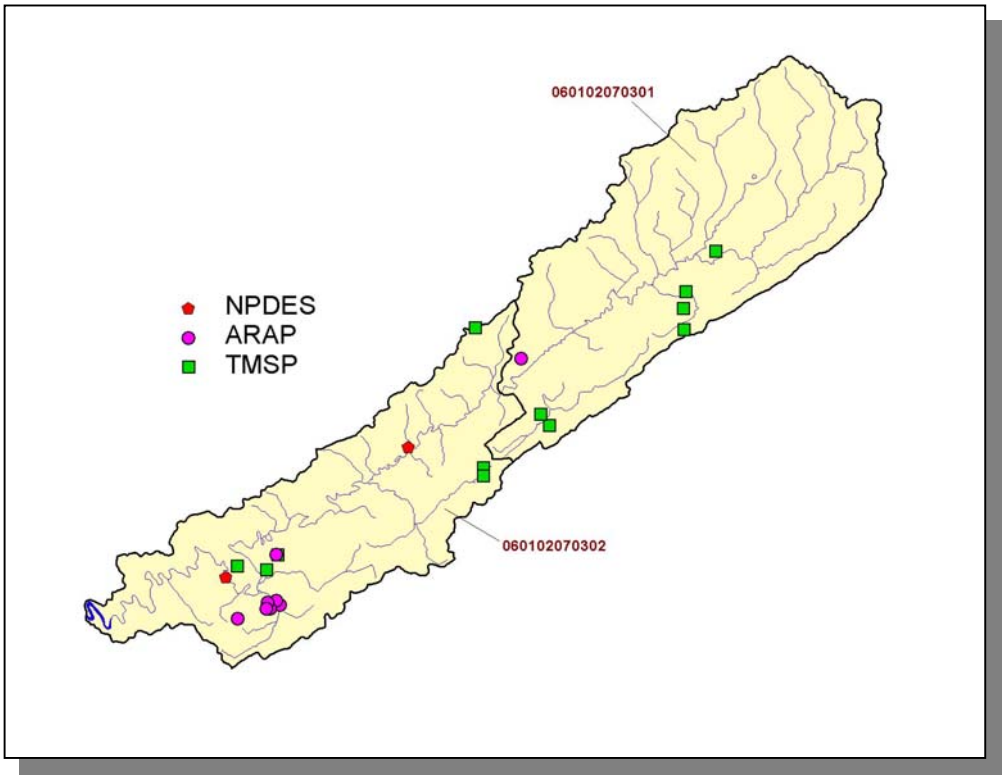

Figure 4-36. Location of Active Point Source Facilities in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

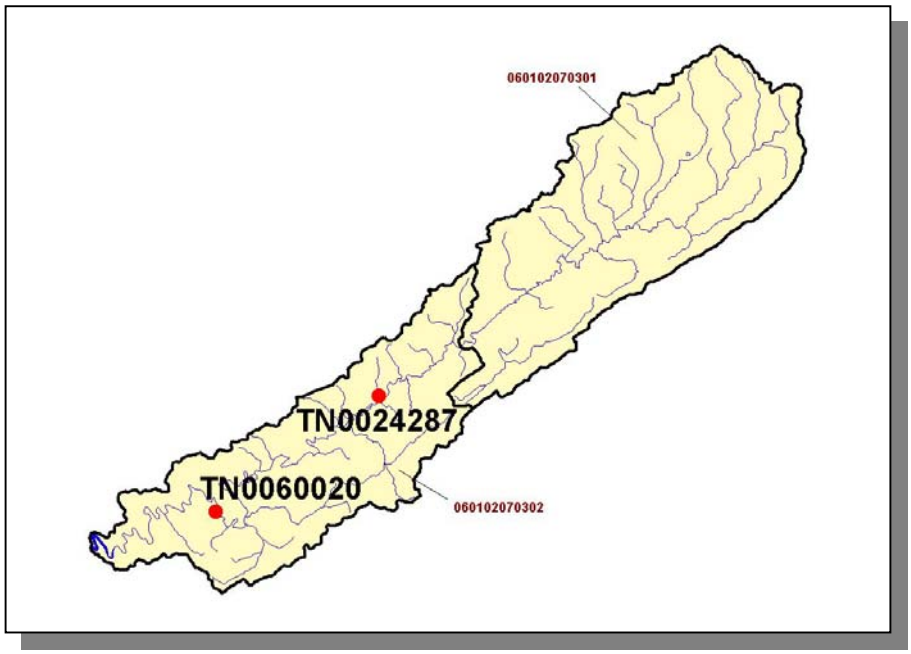

Figure 4-37. Location of NPDES Facilities in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

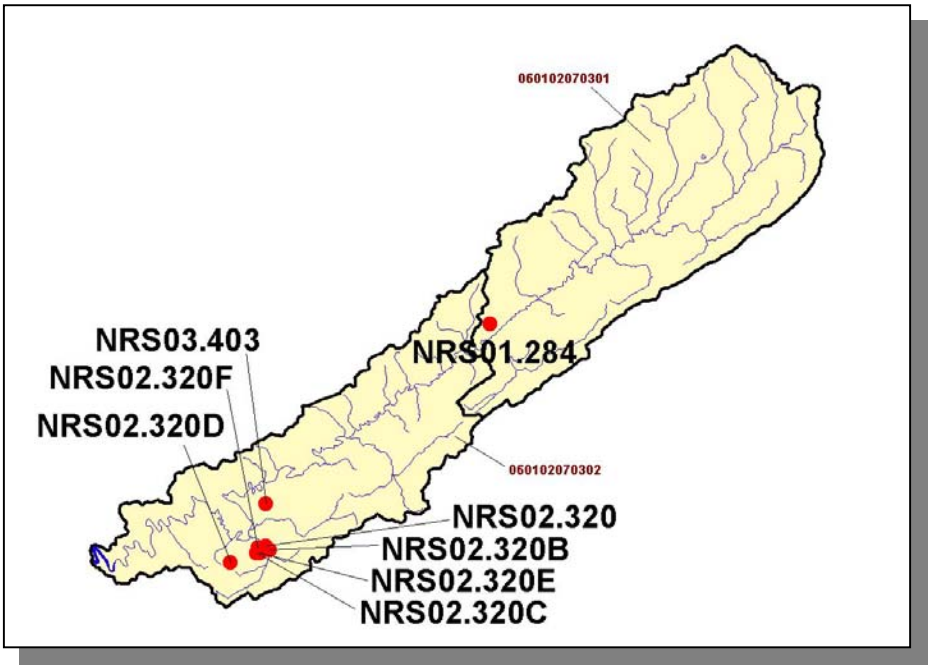

Figure 4-38. Location of ARAP Sites (Individual Permits) in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

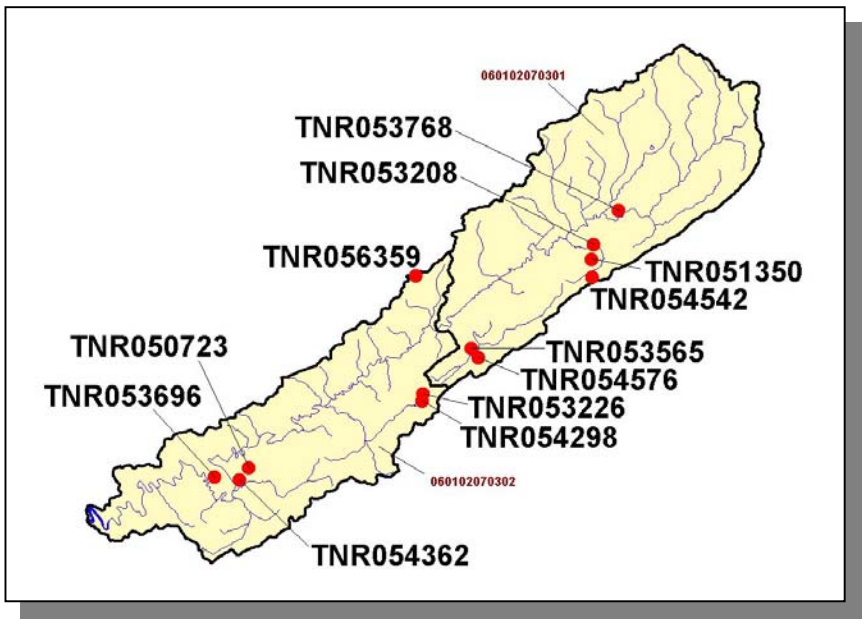

Figure 4-39. Location of TMSP Facilities in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.C.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There are two NPDES facilities discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0601020703:

- TN0024287 (Hallsdale-Powell Utility District STP) discharges to Beaver Creek @ RM 23.5
- TN0060020 (West Knox Utility District-Karns Beaver Creek STP) discharges to Beaver Creek @ RM 10.7

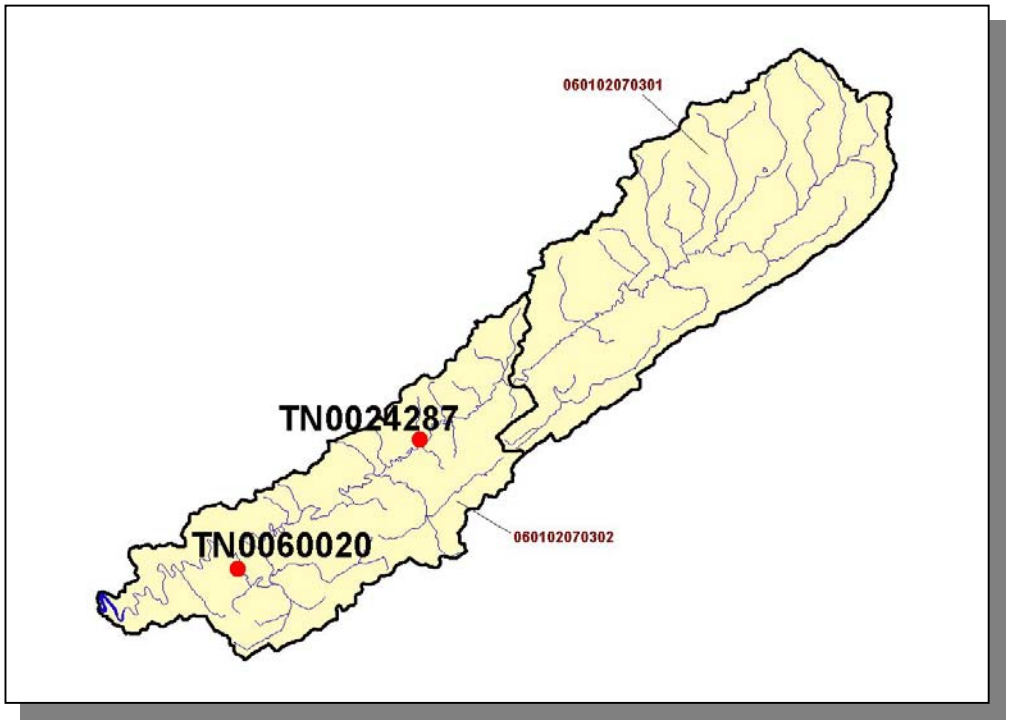

Figure 4-40. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0601020703. *Subwatershed 060102070301 and 060102070302 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0024287	3.9	4.0	4.3	3.7	9.0
TN0060020	6.0	6.2	6.7	5.7	4.0

Table 4-24. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020703. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	TSS	TOTAL N	TOTAL P
TN0024287	X		
TN0060020	X	X	X

Table 4-25. Monitoring Requirements for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020703. *TSS, Total Suspended Solids.*

PERMIT #	WET	$CBOD_5$	FECAL COLIFORM	*E. COLI*	Pb	Hg	NH_3	SETTLEABLE SOLIDS	TRC	DO	pH
TN0024287			X	X		X		X	X	X	X
TN0060020	X	X	X	X	X		X	X	X	X	X

Table 4-26. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020703. *WET, Whole Effluent Toxicity; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TRC, Total Residual Chlorine; TSS, Total Suspended Solids.*

4.2.C.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Cattle	Milk Cow	Chickens (Layers)	Chickens Sold	Hogs	Sheep
2,931	5,820	202	8	<5	201	153

Table 4-27. Summary of Livestock Count Estimates in Subwatershed 0601020703. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Anderson	124.0	124.0	2.6	6.2
Knox	127.5	127.0	2.2	8.2
Totals	**251.5**	**251.0**	**4.8**	**14.4**

Table 4-28. Forest Acreage and Average Annual Removal Rates (1987-1994) in Subwatershed 0601020703.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	0.90
Legumes (Hayland)	1.07
Grass (Hayland)	0.12
Legumes, Grass (Hayland)	0.25
Grass, Forbs, Legumes (Mixed Pasture)	0.47
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	1.10
Soybeans (Row Crops)	15.54
Tobacco (Row Crops)	1.62
Wheat (Close-Grown Cropland)	4.44
Other Vegetable and Truck Crops	12.06
Non-Agricultural Land Use	0.00
Other Land in Farms	0.23
Farmsteads and Ranch Headquarters	0.18

Table 4-29. Annual Estimated Total Soil Loss in Subwatershed 0601020703.

4.2.D. 0601020705 (Poplar Creek).

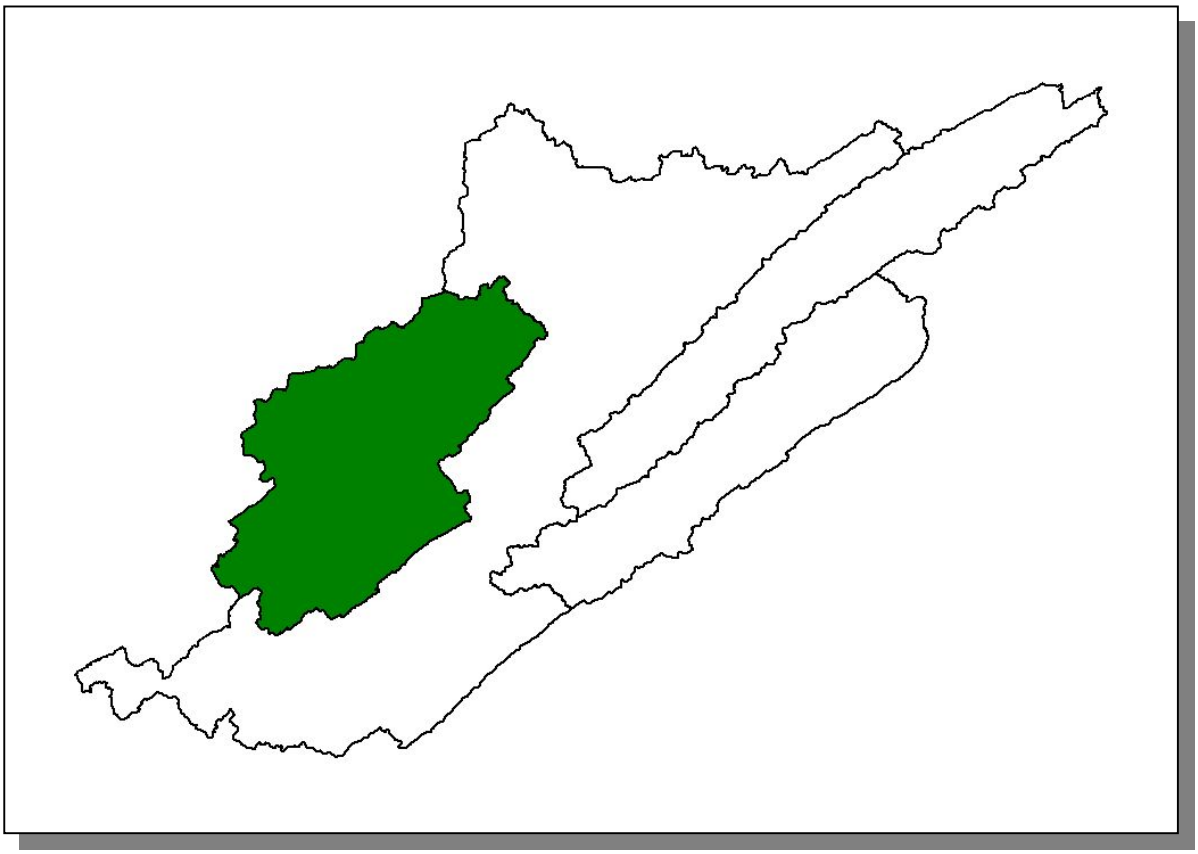

Figure 4-41. Location of Subwatershed 0601020705. *All Lower Clinch River HUC-10 subwatershed boundaries are shown for reference.*

4.2.D.i. General Description.

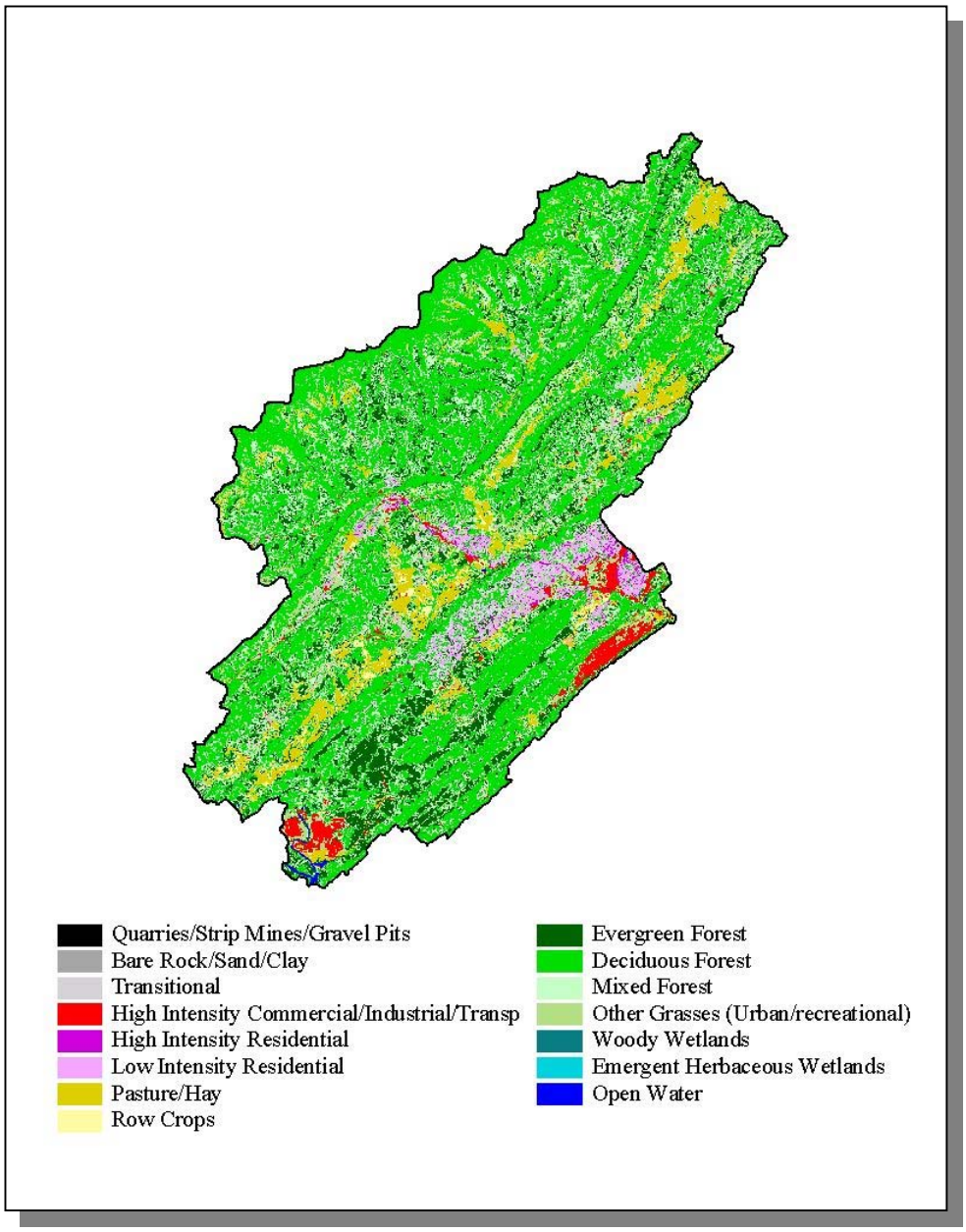

Figure 4-42. Illustration of Land Use Distribution in Subwatershed 0601020705.

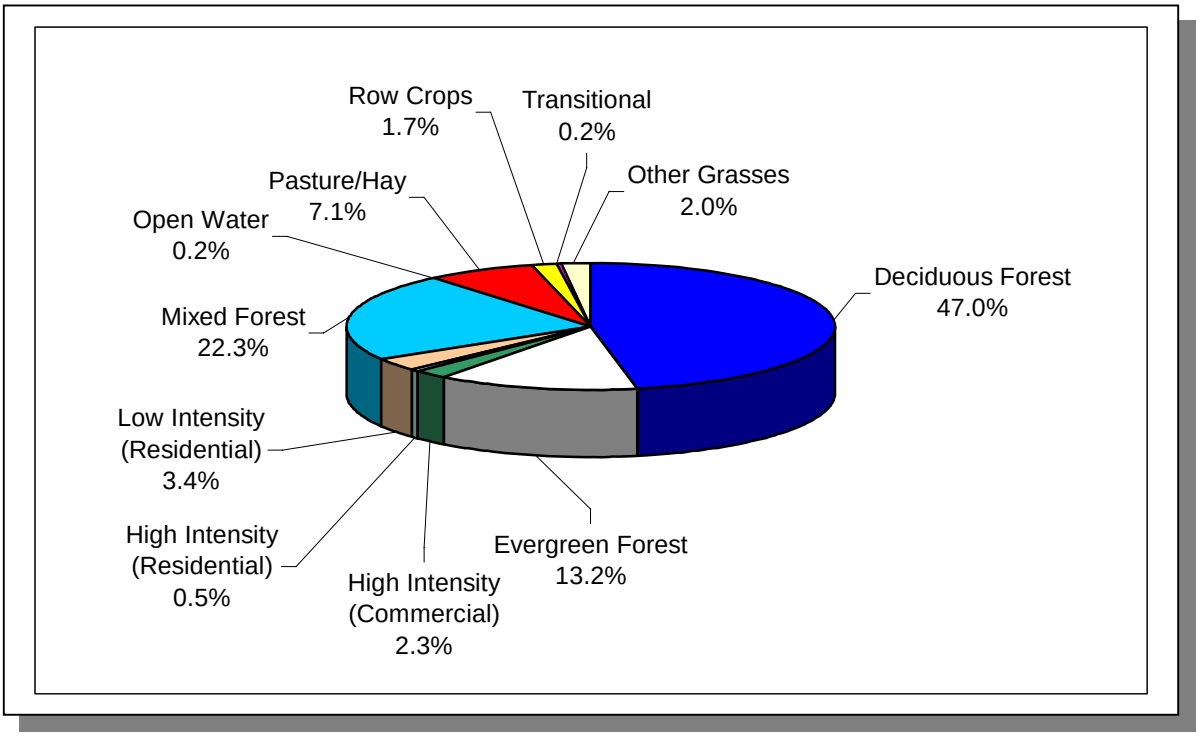

Figure 4-43. Land Use Distribution in Subwatershed 0601020705. *More information is provided in Appendix IV.*

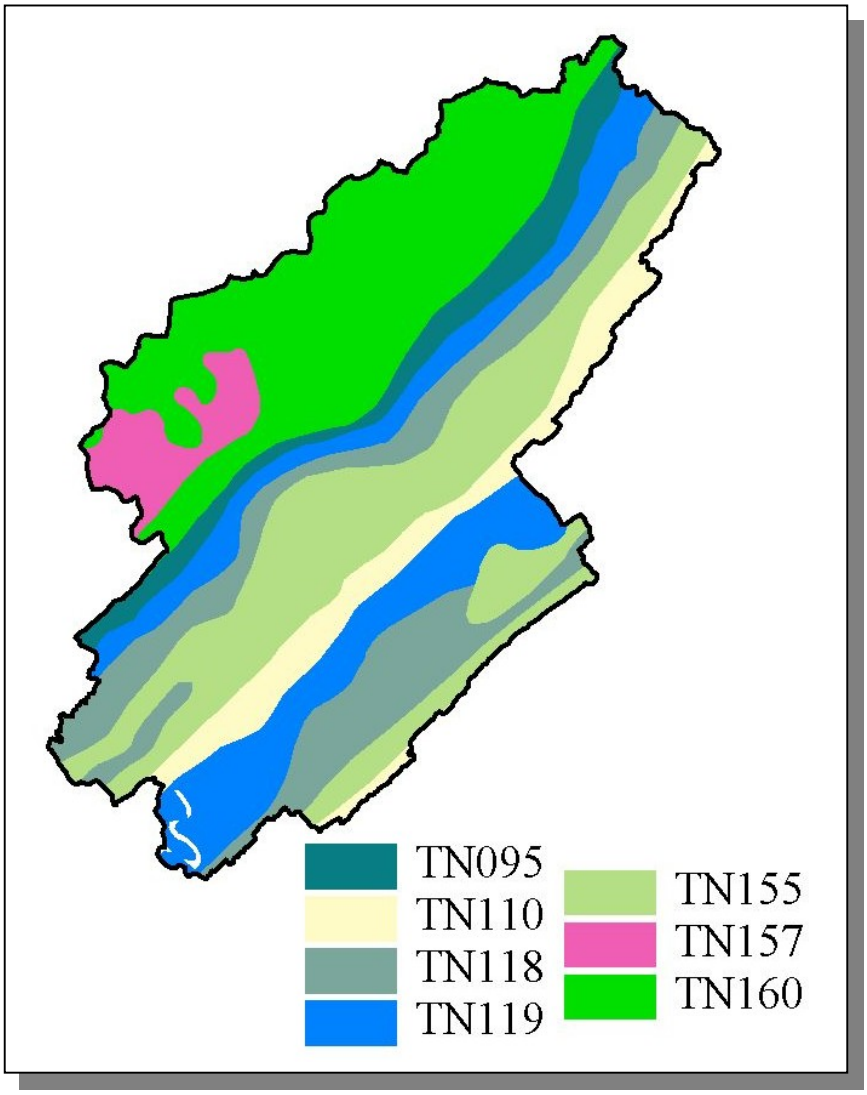

Figure 4-44. STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020705.

STATSGO MAP UNIT ID	PERCENT HYDRIC	HYDROLOGIC GROUP	PERMEABILITY (in/hr)	SOIL pH	ESTIMATED SOIL TEXTURE	SOIL ERODIBILITY
TN095	0.00	B	2.35	5.12	Loam	0.31
TN110	0.00	B	2.22	4.96	Loam	0.31
TN118	0.00	C	6.52	5.12	Loam	0.29
TN119	2.00	C	1.08	5.15	Loam	0.33
TN155	0.00	C	1.71	5.31	Loam	0.32
TN157	0.00	B	2.38	4.62	Loam	0.28
TN160	0.00	B	2.69	5.36	Loam	0.25

Table 4-30. Soil Characteristics by STATSGO (State Soil Geographic Database) Soil Map Units in Subwatershed 0601020705. *More information is provided in Appendix IV.*

	COUNTY POPULATION				ESTIMATED POPULATION IN WATERSHED			
County	1990	1997	2000	Portion of Watershed (%)	1990	1997	2000	% Change (1990-1997)
Anderson	68,250	71,498	71,330	22.47	15,334	16,063	16,026	4.5
Morgan	17,300	18,521	19,757	2.28	394	422	450	14.2
Roane	47,227	49,885	51,910	11.97	5,653	5,972	6,214	9.9
Totals	**132,777**	139,904	**142,997**		**21,381**	**22,457**	**22,690**	**6.1**

Table 4-31. Population Estimates in Subwatershed 0601020705

			NUMBER OF HOUSING UNITS			
Populated Place	County	Population	Total	Public Sewer	Septic Tank	Other
Oak Ridge	Roane	27,310	12,694	12,461	212	21
Oliver Springs	Roane	3,275	1,306	1,165	141	0
Totals		**30,585**	**14,000**	**13,626**	**353**	**21**

Table 4-32. Housing and Sewage Disposal Practices of Select Communities in Subwatershed 0601020705.

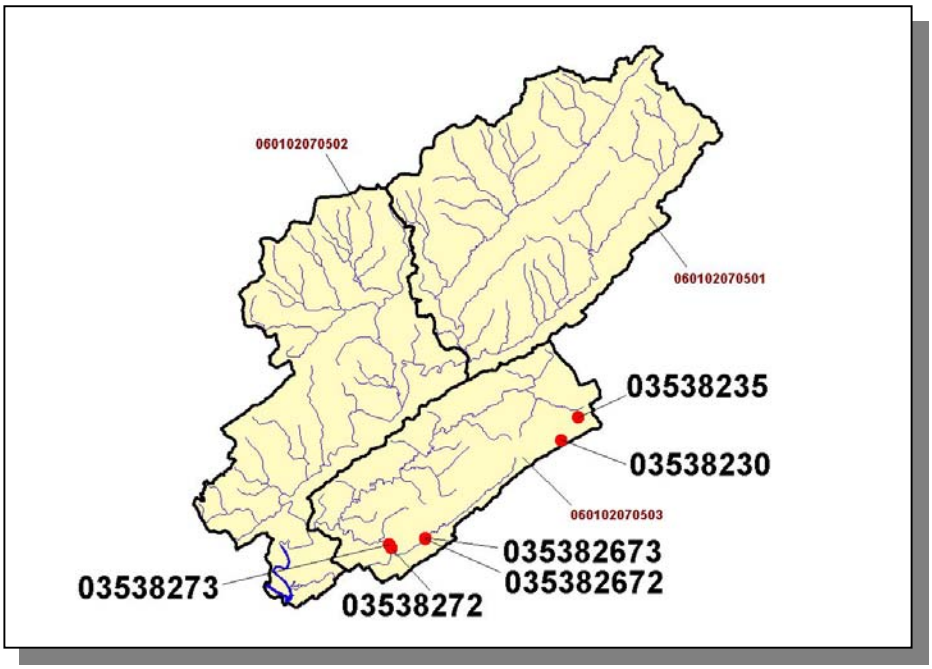

Figure 4-45. Location of Historical Streamflow Data Collection Sites in Subwatershed 0601020705. *Subwatershed 060102070501, 0604000402, 060102070502 and 060102070503 boundaries are shown for reference. More information is provided in Appendix IV.*

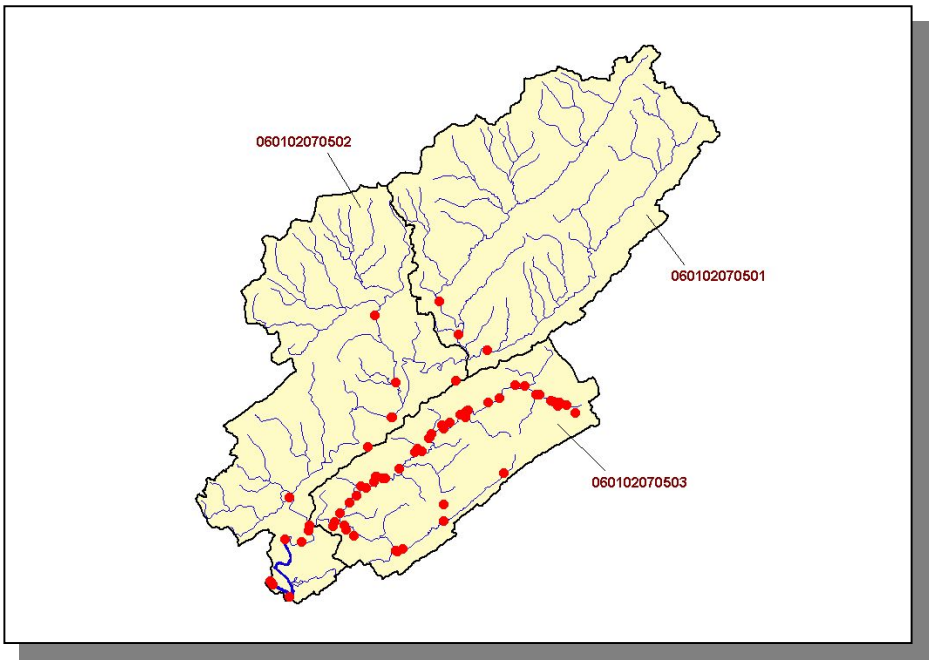

Figure 4-46. Location of STORET Monitoring Sites in Subwatershed 0601020705. *Subwatershed 060102070501, 0604000402, 060102070502 and 060102070503 boundaries are shown for reference. More information, including site names and locations, is provided in Appendix IV.*

4.2.D.ii. Point Source Contributions.

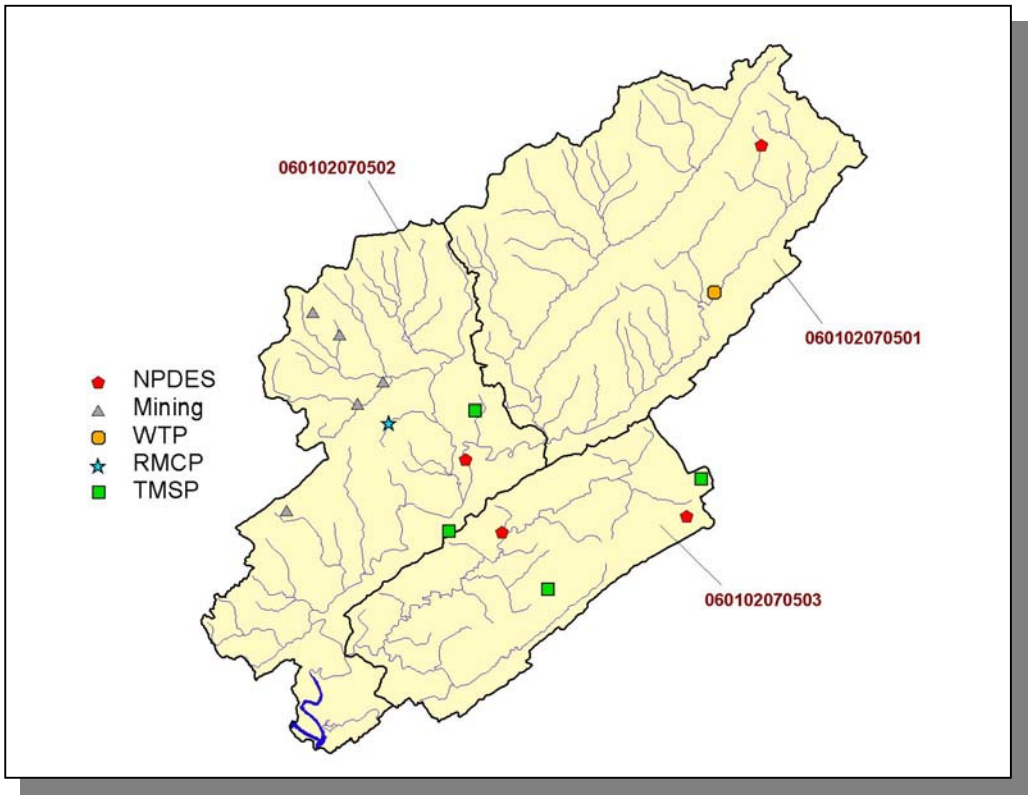

Figure 4-47. Location of Active Point Source Facilities in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

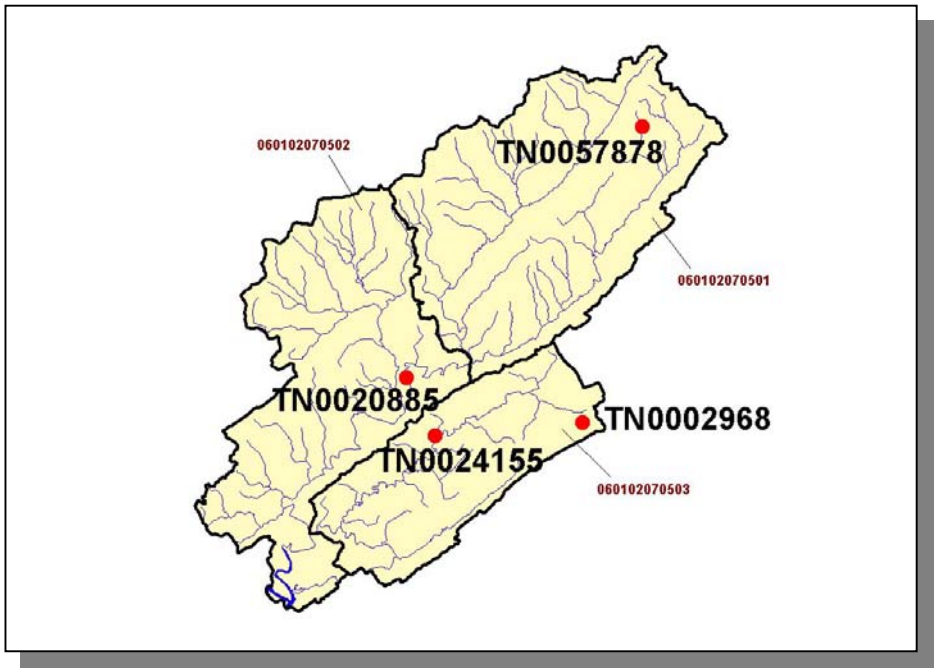

Figure 4-48. Location of NPDES Facilities in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

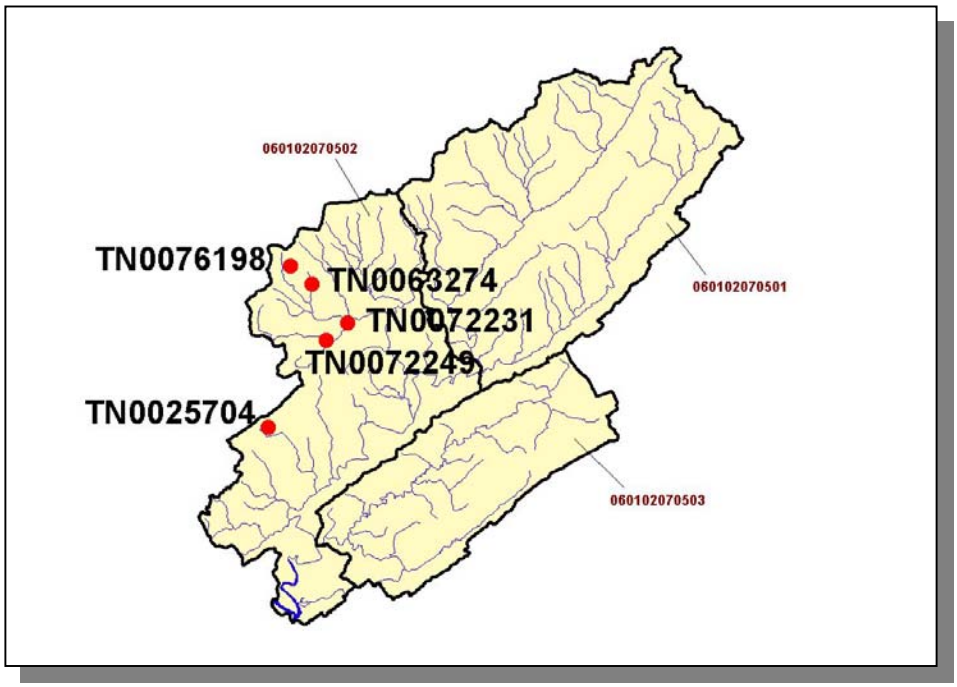

Figure 4-49. Location of Active Mining Facilities in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

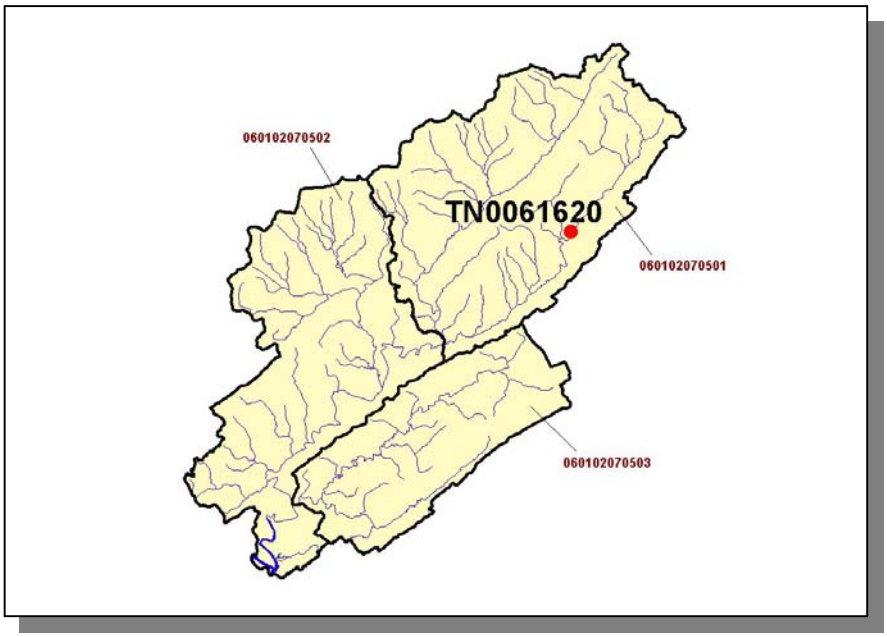

Figure 4-50. Location of Water Treatment Plants in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

Figure 4-51. Location of Ready Mix Concrete Plants in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

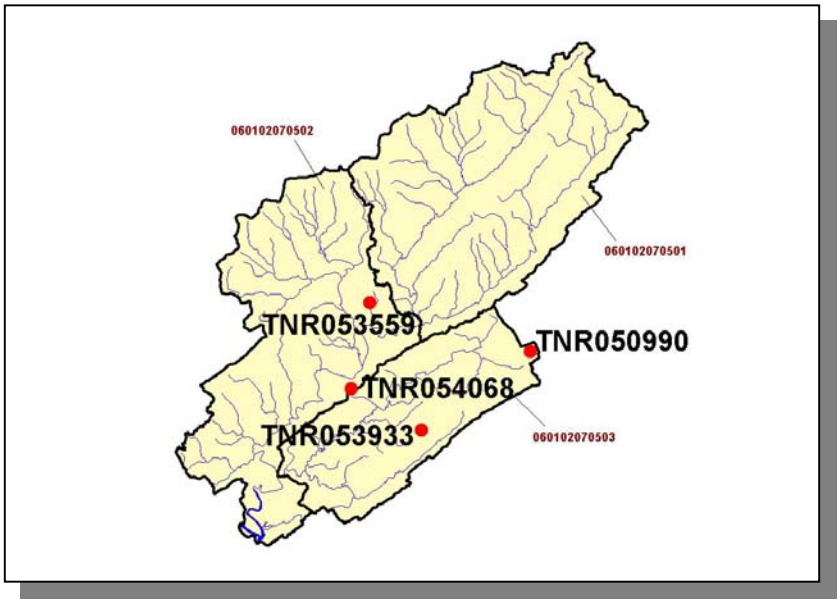

Figure 4-52. Location of TMSP Facilities in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

4.2.D.ii.a. Dischargers to Water Bodies Listed on the 2002 303(d) List

There is one NPDES facility discharging to water bodies listed on the 2002 303(d) list in Subwatershed 0601020705:

- TN0024155 (Oak Ridge STP) discharges to East Fork Poplar Creek @ RM 8.3

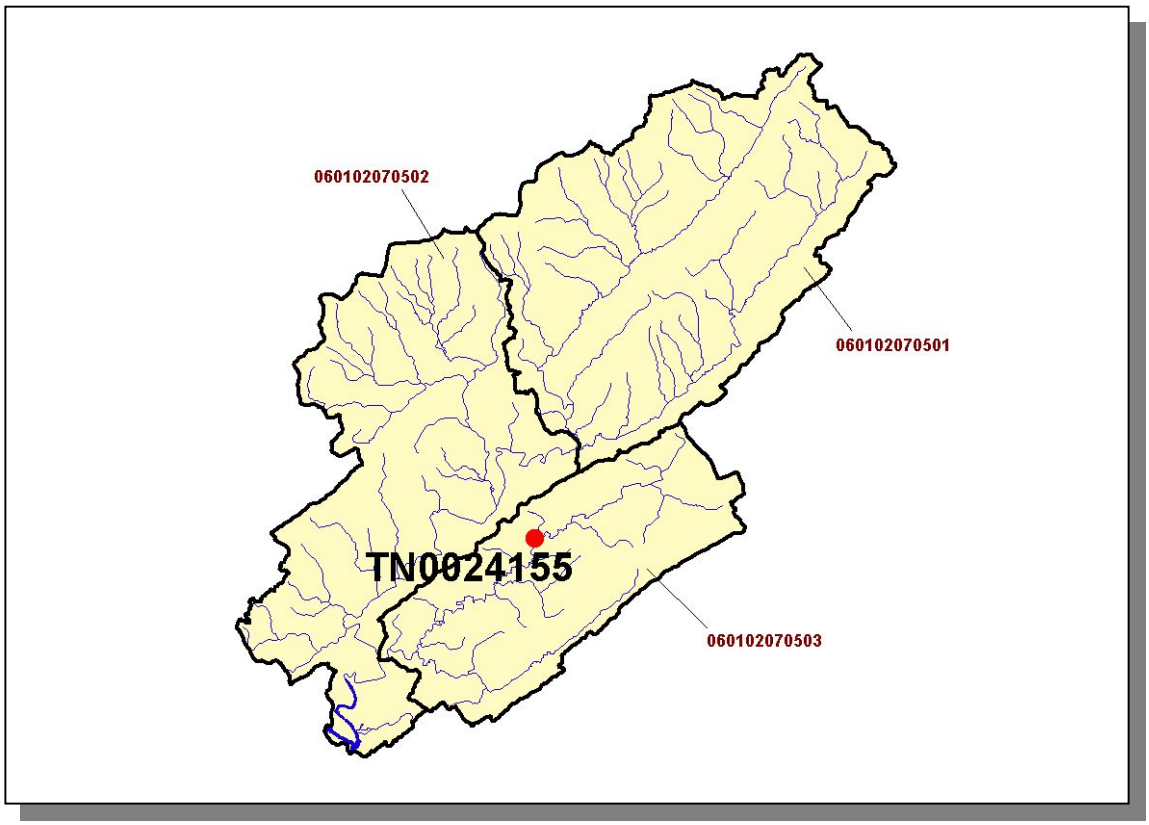

Figure 4-53. Location of NPDES Dischargers to Water Bodies Listed on the 2002 303(d) List in Subwatershed 0601020705. *Subwatershed 060102070501, 060102070502, and 060102070503 boundaries are shown for reference. More information, including the names of facilities, is provided in Appendix IV.*

PERMIT #	1Q10	3Q10	7Q10	3Q20	QDESIGN
TN0024155	14.4	15.8	16.5	15.1	5.87

Table 4-33. Receiving Stream Flow Information for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020705. *Data are in million gallons per day (MGD). Data were obtained from the USGS publication Flow Duration and Low Flows of Tennessee Streams Through 1992 or from permit files.*

PERMIT #	WET	$CBOD_5$	FECAL COLIFORM	NH_3	*E. COLI*	TSS	SETTLEABLE SOLIDS	CN	DO	pH
TN0024155	X	X	X	X	X	X	X	X	X	X

Table 4-34. Parameters Monitored for Daily Maximum Limits for NPDES Dischargers to Waterbodies Listed on the 2002 303(d) List in Subwatershed 0601020705. *WET, Whole Effluent Toxicity; $CBOD_5$, Carbonaceous Biochemical Oxygen Demand (5-Day); TSS, Total Suspended Solids.*

4.2.D.iii. Nonpoint Source Contributions.

LIVESTOCK (COUNTS)						
Beef Cow	Milk Cow	Cattle	Chickens (Layers)	Chickens (Broilers Sold)	Hogs	Sheep
1,954	142	3,924	10	74,854	24	47

Table 4-35. Summary of Livestock Count Estimates in Subwatershed 0601020705. *According to the 1997 Census of Agriculture (http://www.nass.usda.gov/census/), "Cattle" includes heifers, heifer calves, steers, bulls and bull calves; "Chickens" are layers 20 weeks and older; "Chickens Sold" are all chickens used to produce meat.*

	INVENTORY		REMOVAL RATE	
County	Forest Land (thousand acres)	Timber Land (thousand acres)	Growing Stock (million cubic feet)	Sawtimber (million board feet)
Anderson	124.0	124.0	2.6	6.2
Morgan	287.8	276.2	3.5	10.9
Roane	153.1	153.1	1.7	5.1
Totals	**564.9**	**553.3**	**7.8**	**22.2**

Table 4-36. Forest Acreage and Annual Removal Rates (1987-1994) in Subwatershed 0601020705.

CROPS	TONS/ACRE/YEAR
Grass (Pastureland)	1.68
Legumes (Pastureland)	0.23
Legumes (Hayland)	1.07
Grass (Hayland)	0.75
Legumes, Grass (Hayland)	2.01
Grass, Forbs, Legumes (Mixed Pasture)	1.13
Forest Land (Not Grazed)	0.00
Forest Land (Grazed)	0.00
Corn (Row Crops)	7.18
Tobacco (Row Crops)	1.62
Other Vegetable and Truck Crops	12.06
Non-Agricultural Land Use	0.00
Other Land in Farms	0.23
Farmsteads and Ranch Headquarters	1.16

Table 4-37. Annual Estimated Soil Loss in Subwatershed 0601020705.